

**Pacemakers for Industry**  
MITCHELL CONSTRUCTION

# FINANCIAL TIMES

No. 25,538

Monday August 23 1971

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**Thy make do n**  
SPACE CORRESPONDENT  
Thwaites Engin...  
Leamington Spa, Engla...

## The world currency scene as markets reopen to-day

BY WILLIAM KEEGAN, ECONOMICS CORRESPONDENT

**THE POUND**, the Belgian franc, the Italian lira and the Swedish, sh and Norwegian krone are all being revalued. The German mark and the Japanese yen are also being revalued. The French are to stay high. The German Government hopes it will float down to 5 or 6 per cent above parity.

### FRANCE

The new two-tiered exchange market starts to-day, with a freely floating "financial franc" for capital and tourist transactions, while current transactions remain at the official dollar exchange rate, which the Government insists will not be altered. Banking sources predict a 5 to 8 per cent effective devaluation of the dollar when it floats against the "financial franc", or a rate of Frs.5.20 to 5.30 to the dollar. It is estimated that three-quarters of all transactions take place on the commercial market.

President Pompidou is believed to favour Herr Brandt's proposal for the two to meet to resolve the Franco-German monetary dispute.

### BENELUX

The Netherlands, Belgium and Luxembourg are to operate a joint controlled float as a single monetary bloc. Belgium is to retain its two-tier exchange market but the Belgian franc will now float against the dollar—

**Trade, not money, is the problem now**  
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up to-day. From now on, central banks will intervene to prevent exchange rates of the two from moving more than 1 per cent away from each other either way.

For example, if the guilder was 4 per cent above the dollar, the Belgian franc would be kept in the range 21 per cent to 51 per cent above the dollar.

**ITALY**  
Wider margins are operating from to-day, but there is no official statement on the levels at which the Bank of Italy will intervene. The official parity—lira 825 to the dollar—stays.

### SWITZERLAND

The Cabinet is to meet this morning but no decision has been taken yet on exchange rate policy and the market is again officially closed to-day. This means the central bank will not

intervene, but on the basis of the last week's experience dealings can still take place.

### SWEDEN

Dealings resume to-day with no lower limit for the dollar against the krona. Banking sources suggest that the krona may initially float upwards by around 21 per cent.

### DENMARK

The Danish central bank says it intends to maintain the krona parity, but it will temporarily suspend the official intervention rate of krone 7.4433 for buying dollars when dealings reopen. Market sources expect the krona to float up initially.

### NORWAY

Oslo's foreign currency bureau says the Norwegian Trade Minister predicts that the krona value in terms of the dollar will rise "to a certain extent". The krona is to float, with central bank intervention if fluctuations are too great.

### AUSTRIA

The foreign exchange market will remain closed to-day, and an official policy statement is not expected until after a special Cabinet meeting this afternoon.

### ISRAEL

Israel became the first country to devalue in the wake of the

U.S. surcharge. The Israeli pound is devalued by 20 per cent, from 3.5 Israeli pounds to the dollar to 4.2. The surcharge was the final blow but Israel was increasingly feeling the effects of EEC tariffs there is to be a wage freeze and price restraint.

### INDIA

The rupee-dollar rate is to float in line with the London dollar sterling rate, but the rupee-dollar parity remains officially unchanged.

### JAPAN

The Japanese Ambassador in the U.S., returning to Tokyo for urgent talks, told reporters that the U.S. did not regard yen revaluation as the only precondition for withdrawing its surcharge and was pressing for a package deal to settle all outstanding economic disputes between the two countries. This would include speedy action to remove the remaining Japanese post-war protectionist barriers. Meanwhile, Finance Ministry officials ruled out any immediate floating of the yen on grounds that this would be tantamount to revaluation.

### EEC

Benelux Governments proposed another meeting of the EEC Council at the beginning of September because it was "absolutely necessary that the prin-

### UNITED STATES

The balance of payments deficit on official settlements basis for the six weeks between the beginning of July and the surcharge announcement is put at "perhaps \$10,000m." by the usually accurate Morgan Guaranty estimates. This "increases the official settlements deficit to \$22,000m. for the first 71 months of 1971, of which it is estimated, \$5,000m. was current and long-term capital and \$17,000m. was the moving of interest-sensitive funds. Of the last six weeks' outflow of \$10,000m. some \$3,500m. ended up in Japan, \$2,500m. in Switzerland, and \$3,000m. in other European countries.

### SHIPPING

Shipping conferences which changed their tariff currency from sterling to dollars after the U.K. devaluation of 1967 have now been told that for the time being freight should only be paid in local currencies at exchange rates ruling on August 13.

## EEC plan to challenge surcharge

BY REGINALD DALE, COMMON MARKET CORRESPONDENT

BRUSSELS, August 22.

THE European Community is to challenge the legality of President Nixon's 10 per cent import surcharge at the special GATT meeting to discuss the U.S. measures in Geneva on Tuesday. But the exact nature of the challenge will depend on the course that the talks take, according to commission sources here.

The least that the Community will do is to demand the setting-up of a high-level group of experts to make a rapid investigation into the surcharge's conformity with GATT rules. The community delegation, led by Dr. Ralf Dahrendorf of the Commission, will try to keep the atmosphere calm, but it will be ready to take a tough line if necessary.

In an attempt to head off these pressures, at least for the time being, the Commission is to propose that the Six grant help to the industries most seriously hit by the surcharge. These would probably at least include cars, chemicals, textiles and shoes. But the Commission has little hope of holding back the pressure in this way if the surcharge were to continue into next year.

The Commission is also afraid that the longer the surcharge lasts the less likely it is to be "temporary." The fear is that once American industry has become used to the new protective device, it will fight increasingly hard against its removal.

**Disturbing**  
One of the factors that is disturbing the Six most of all is that the Americans are giving absolutely no clue as to what the Community must do to get

**Steel pact**  
Although the U.S. Administration has claimed that the surcharge will hit only 50 per cent of total American imports, the Commission points out that the figure is more likely to be 80 per cent, or above in the Community's case. This would mean that about \$5,500m. out of the Six's total exports to the U.S. of \$6,600m. would be affected.

The effect on Community steel exports, already subject to a voluntary self-limitation pact, has inflamed tempers in the European industry. Although America is exempting other self-limitation agreements from the surcharge it is apparently including steel on the grounds that the limitation is "voluntary" rather than formal.

The European steelmakers have said they will consider their self-limitation agreement null and void if the surcharge is applied to them. But Dr. Dahrendorf is unlikely to raise the issue in Geneva, as the agreement was entered into by the industries concerned rather than by Governments. There are still some doubts in the Commission as to whether it is in fact compatible with the Community's own rules of competition.

In general, the Commission shares the view that America will find it difficult, if not impossible, ever to arrange a Charter of Commerce pact in free trade which continues in its detour, its quarterlies to impose the surcharge. In rebuttal of President Kennedy's charge of "unfairness" against major trading partners, Commission officials point out that the end of the Kennedy Round negotiations, the number of export limitation pacts with U.S. by other countries has risen from seven to 67.

Tough talking ahead and a back Page

President Nixon meeting opposition to surcharge

The Community delegation will be pressing for clarification on this point this week.

A senior committee of experts from the Commission and the six member countries will be meeting in Geneva tomorrow afternoon to prepare Tuesday's session. But it is the Commission's prerogative to speak for the Community on the issue, and Dr. Dahrendorf has already made clear the main points of his position.

The Commission regards the import surcharge as by far the most urgent problem posed by the American measures in the trade field, and claims it has already wiped out all the benefits of the Kennedy Round. There are concerns here about other elements of the American package—such as its "Buy American" aspects and the export tax rebates—but these are not regarded as being of such immediate urgency.

Dr. Dahrendorf has come out against "crude retaliation" by the Community, but the Commission is worried that the longer

had refused to meet Mr. Kelly (which this month he delivered the last of a number of rigs involved in North Sea exploration) was Mr. Kelly's own "declaration of intent" including the other yards.

When Sir John is going to make his bid for Clydebank and possibly for Govan-Linthouse? Sir John had said he hoped to announce the "embryo Board" which would form the nucleus of the new Government-sponsored company for the latter early next month. The hint coming from Sir John's quarters is that he might beat Sir John to it.

**F.T. share index hourly**  
Financial Times Reporter

The Financial Times Industrial Ordinary share index is now being calculated on an hourly basis. Since the beginning of 1965, it has been calculated four times daily, on prices ruling at 10.30 a.m., noon, 2.45 p.m. and the close.

From to-day, the index will be made available seven times a day. Apart from the usual closing index, based on prices at 4 p.m. and sometimes beyond 5 p.m. depending on "after-hours" activity, calculations will be made every hour on the hour—from 10 a.m. to 3 p.m.—during official Stock Exchange trading which starts at 9.30 a.m. and ends at 3.30 p.m.

The index figures will be made available to the GPO for incorporation in the Financial Times Business News Summary telephone service on (01) 548 8026 and a record of the index will appear in the Financial Times Stock Indices table on the Stock Exchange Report page.

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## News Summary

### AL BUSINESS

**Mersey dockers pay pact**  
Blasted the main gate at Road Prison, Belfast, tonight, wounding two men seriously, and two prisoners.

uses said the explosive was from a car passing Bombs also damaged a telephone exchange in the city centre, is cordoned off.

seven men were held and Army raids in the

**cells boycott**  
100 anti-Unionist of local councils after a meeting last night following the of George Jackson, the Negro militant, on an escape bid at San Jail, California. Two prisoners and three were killed in the

**hopes**  
in Berlin by the four is expected to-day—but ends must then give

**out demo**  
9 people, mostly American, demonstrated outside the Embassy in Grosvenor at night following the of George Jackson, the Negro militant, on an escape bid at San Jail, California. Two prisoners and three were killed in the

**charges**  
clashes at Saturday's City-Derby County people appear at to-day on various Trevor Nunn, 20, ter the match, was "a

**delegation**  
7th anniversary celebration from the President Ceausescu's right to lead the world and urged the alert amid "threats

**light-wing rebel leader**  
3anzer was proclaimed in La Paz last night.

**awpwe, former Vice-**  
Zambia, said he had verment and formed "realist" opposition United Progressives.

**Festival opened.**  
300 are expected to the three weeks.

**e-President Ali Sabri**  
ers, including seven were formally Cairo with high

**minum Bond winner**  
\$2340809, living in

## Kelly in UCS talks to-day

BY ANDREW HARGRAVE, SCOTTISH CORRESPONDENT

GLASGOW, August 22.

**MR. ARCHIBALD KELLY**, the Clydebank industrialist interested in acquiring part or all of Upper Clyde Shipbuilders, will to-morrow take a close look at the assets and the gap which must now exist between the contract prices of ships on order and one which includes a realistic margin for profit.

The contracts, I understand, include those not yet started and suspended by the liquidator, Mr. Robert C. Smith, after UCS had gone bankrupt on June 14. Down payments on these contracts must be considered lost and the owners will no doubt make the point when they meet Mr. Nicholas Ridley, of the Department for Trade and Industry, next Friday. It will also be one of the major points of discussion between Mr. Kelly and Mr. Smith here to-morrow.

**Mr. Robert C. Smith, UCS liquidator, who meets Mr. Archibald Kelly, Clydebank industrialist, to-day.**

### No obstacle

Mr. Kelly, who had a meeting with Sir John Eden, Minister for Industry, in London last Tuesday, may have had something stronger than a hint that the price gap will be no obstacle provided he submits a viable proposition.

The valuation of assets will be another major topic for to-morrow's meeting, especially as it is within eight days of the UCS creditors' meeting. But there is yet another vital matter that only Mr. Kelly can resolve: Will he be able to raise not only the price but the necessary working capital for Clydebank (his original choice) let alone

all four units? The need for the whole complex in terms of working capital is now estimated as at least £10m. compared with £2m. of which forced UCS into liquidation. So far, Mr. Kelly has admitted to access for up to £1m. only; and even if the Government is willing to contribute to buying the assets, bridging the price gaps and raising initial working capital under the Local Employment Act, the Government's development area status, Mr. Kelly will have to raise a great deal more to match it.

There is, however, I understand, more than a passing interest shown in terms of invest-

### Unions view

to to-morrow's meeting Mr. Kelly will be accompanied by his financial adviser, Mr. James Sharp, and the financial director of the shipbuilders, Mr. Mitchell Murray.

One hurdle Mr. Kelly has partially overcome is opposition from the shop stewards who hope to-morrow to begin in earnest the "work in" which has been in force since July 30. Mr. James Reid, a senior Clydebank shop steward, said to-day he expected the big majority of the 166 workers dismissed on Friday to report for work as usual to-morrow, to be paid from the UCS's fighting fund.

Previously the shop stewards

## Malta: Carrington to see Heath to-day

BY MICHAEL SIMMONS

**LORD Carrington**, the Defence Secretary, will see Mr. Heath at Chequers to-day to discuss the next steps to be taken in the continuing dialogue with Don Minoff, the Maltese Prime Minister. On his return from Malta on Saturday, Lord Carrington spoke on the telephone to Mr. Heath.

It is understood that Lord Carrington has returned from Valletta moderately optimistic about the chances of reaching a settlement with Mr. Minoff.

His conversations with the Maltese leader lasted about four hours in all, and his optimism, according to Whitehall sources, is based on the comparatively reasonable approach now being adopted by Mr. Minoff.

The latter is now expected, after a few days, to announce that Britain can alter all keep its base on the island—but for a yearly rental of £25m. rather than the £25m. reached by Britain after talks with some NATO partners.

This total was made up of £5m. cash grant and the residue in economic aid—though these provisions might be revised in the light of Mr. Minoff's latest demands. The Ministry of Defence officials who returned with Lord Carrington will be putting these demands to the interested NATO countries in Brussels later this week.

These demands would also take in the likely uses to which the base would be put. Mr. Minoff would almost certainly insist that a provision should not be used against Malta's Arab neighbours.

**Advantage**

But it is thought that he would not draw too fine a point over whether a U.K. military presence would be of advantage to Britain alone—as Mr. Minoff insisted at the outset—or to the NATO alliance as a whole.

At the same time, despite his intention of ridding the island of foreign servicemen as soon as possible, he may well be prepared for an agreement of longer duration—perhaps 10 years, rather than the three to five years that he has so far indicated.

With an assured Budget subsidy for the longer period Mr. Minoff would probably be con-

ident of reaching self-sufficiency. Richard Jones cables from Valletta: "Malta's financial plight has been under, rather than overstated, in recent reports. The Government will need cash aid by the autumn if it is to pay its way."

Even before the Labour Government came to power, the £25m. ceiling for the raising of money through Treasury bills and the £5.5m. ceiling for borrowing from the central banks had been reached.

Because of delays by the former Nationalist administration in sending out income tax forms, the source of revenue from taxation has been at a trickle this summer.

On the other hand, Britain and NATO have to decide the value which they place on the facilities. It is understood that the capital costs of moving the facilities elsewhere would be anything from £5m. to £20m., but there would be a saving of perhaps as much as £5m. a year in recurrent costs.

Harder to evaluate, however, is the possible loss of aircraft storage facilities and a forward operational base, as well as possible political difficulties in relocating the long-range maritime reconnaissance squadrons to Cyprus.

Malta's cash problems Page 4

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## Export News

## The Editor

BRACKEN HOUSE, CANNON STREET, LONDON, EC4

## price tenders

Mr. Cassell, who has presented the bill, has expressed his confidence in the Government's policy of this Government.

The construction industry, buffeted by the inflationary spiral of the past few years, used as an "economic regulator" by successive Governments, held to ransom when S.E.T. was introduced and now expected to refund the 50 per cent. cut, has just about reached the end of its patience.

This Federation does not accept that it "has gone as far as it can" by stating unequivocally that it can no longer support the Government. The National Director, in an interview with the Minister of Housing and Construction, the Rt. Hon. Julian Amery, made it quite clear to the Minister that the industry may have to take further and more drastic action.

The statement that to "suggest that contractors should not accept work" in the public sector where fixed price tendering is required is contrary to the Restrictive Trade Practices Act, is correct. This piece of ill-conceived muzzling legislation ought to be repealed immediately.

## Questionnaire

I would make it clear that no such advice is contemplated by this Federation because it is totally unnecessary. The Federation, in conjunction with the Building Trades Journal, has conducted a questionnaire among builders. There is overwhelming evidence to indicate that, contrary to the Minister's belief, builders are refusing to increase price bases, to tender on a fixed price basis.

You mention a case of one of our members in Hull who withdrew from a contract rather than face considerable losses. As a result, Hull Corporation has banned him from tendering for three years, albeit with some reluctance. Another member in the Teesside area has taken similar action and Teesside Corporation circulated all its committees recommending that the firm be refused to tender for three years. The Teesside Education Committee decided not to adopt the recommendation. Earlier this year, the Education Committee awarded the firm three contracts worth about £275,000. It would thus appear that even some local authorities are now convinced that fixed price tendering is unreasonable.

The Federation is now processing the results of its questionnaire and will forward these to the Ministry very shortly. This work has been undertaken because the Federation believes that the Minister is essentially a fair man who has the interests

of the industry, of which he is the sponsor, very much at heart. He has stated that he is not yet convinced that builders are declining to tender on a fixed price basis. The questionnaire devised and circulated and also published in Building Trades Journal, is designed to provide information in support of the industry's claim. It will enable the Minister to confront his colleagues with clear and unambiguous evidence.

J. W. Rowley  
Executive Officer,  
Press and Public Relations,  
Federation of Master Builders,  
33, Judd Street,  
Holborn, WC1N 2BB.

## Snippets out of context

Sir—Those who are against British entry into Europe ought really to cure themselves of the habit of using little snippets of quotation torn out of context. There were two examples of this in your columns on August 18.

Mr. David Lazarus quoted part of a reference by Mr. Heath to this speech on May 19. The Prime Minister urged that the countries of Europe should learn to work together for lasting peace and growing prosperity, and thus achieve by construction and co-operation what Napoleon and Hitler failed to achieve by destruction and conquest. The full quotation has a different meaning from that implied by Mr. Lazarus.

It is not accurate to say, as Mr. K. T. Moore does, that the Conservative Party was elected on a platform to negotiate, no more or less. The paragraphs on Europe in the Conservative Manifesto of 1970 began with a clear statement that if we could negotiate the right terms it would be in the long term interest of the British people for Britain to join. The only specific commitment was to negotiate, and a moment's thought is enough to show that in June 1970 this was the only commitment which it was possible to give, since no-one could know then if negotiations would succeed. But the Manifesto and Mr. Heath's election broadcasts made clear that if negotiations did succeed a Conservative Government would ask Parliament to make a decision on entry.

Douglas Hurd,  
40, Roehampton Gate, S.W.15.

## Cost of a lost share

Sir—Your correspondent, Mr. Thorburn (August 18) appears to convey the impression that com-

pany secretaries and registrars have never been prepared to accept an indemnity in respect of a lost share certificate given by a member firm of a Stock Exchange in this country. Such however is not the case.

Chartered secretaries and registrars have for many years been prepared to accept such indemnities, supported by a bank or other acceptable security, from member firms of Stock Exchanges in this country where such firms consider they may have a responsibility to their shareholder client for the loss of the certificate.

The question of the payment of a charge by a bank for joining in the indemnity is quite outside the control of the company secretary or registrar. Nevertheless Mr. Thorburn and other readers will realise that an indemnity for a lost certificate, supported by a bank remains a continuing liability against the shareholder and the bank supporting the indemnity while the certificate remains missing and a bank charge in such circumstances is not unreasonable, taking into account the market value of the shares represented by the missing certificate.

In the instance quoted by Mr. Thorburn it is assumed that his bank had not contributed to the indemnity, but it is not clear that they had been so responsible, it is certain in my view, that no charge would have been made by them for supporting his indemnity.

R. R. Bedford, F.C.I.S.,  
Chairman,  
Registrars' Group,  
The Chartered Institute of Secretaries,  
16, Park Crescent,  
London, W.1N 4AH.

## Aircraft noise survey

Sir—The Government Social Survey on Aircraft Noise Annoyance bears no relation to present conditions. Since 1967 flights have doubled in number and intensity and the very massive maximum noise levels have trebled by day and quadrupled by night.

Heathrow has become a noisy dangerous anachronism affecting the health and business of 2m. Londoners. It must be closed down as soon as Foulness airport is built, which if Mr. Peter Walker can overcome bureaucratic inertia, could be within 4 years.

It is no part of our policy merely to transfer noise nuisance from one set of people to another. The new airport will be enough offshoot to cause no nuisance to residents and yet be near enough for them to com-

mute across the sterile land between.

The project will bring great prosperity to the area. Property and land prices will rise and business will boom, so everybody should be happy.

John Connell,  
Chairman,  
Noise Abatement Society,  
6 Old Bond Street, W.1.

## Valuation of stocks

Sir—As a partner in a firm of professional stock valuers I was most interested to read the letter from Mr. Griffiths on August 18.

Mr. Griffiths's letter is essentially a plea for (a) consistency in the valuation year by year (an unexceptionable plea) and (b) that the shareholders and bank supporting the indemnity should be made aware of the fact that to what extent a stock increase arises from increased valuation or from increased quantity held.

This does indeed sound a very attractive idea but it is afraid that it grossly oversimplifies the problems involved.

A stock this year will differ from the same firm's stock last year, not only in its quantity and in its value, but also in its very nature. In actually taking stock Mr. Griffiths would find himself confronted with a warehouse full of miscellaneous collection of articles.

Some of these will be physically the same articles as were there 12 months ago, some will be articles identical in nature with those that were there 12 months ago save that their cost has increased, some will be nominally the same as last year's articles but subject to modifications, some of the articles that were there last year are no longer being produced, and yet again there may be whole lines which were not present last year which are now a significant part of the stock.

How then would Mr. Griffiths propose to calculate from this lot so as to show how much of an increase in value is due to an increase in valuation or from increased quantities held?

Even if as he suggests, the way to provide the answer would be to value this year's finished stock, not only at this year's prices but also at last year's prices, it does not seem likely that the value which have no last year's price, either because they are entirely new items in stock, or they have been modified as compared with the equivalent items of last year.

I have dealt with this point at a little length as it is one of the large scale of stock valuations that are frequently made to us as professional valuers by our clients and their accountants,

but which turn out when you are actually presented with the physical stock to value to present intractable difficulties. Even that hoary old chestnut, "What is the value of the written down stock and how much has it been written down?" is one that is in practice almost impossible to determine except in the case of very simple stocks or where the question is limited to specific items of stock. On this point I could write at length!

A stock valuation for accountancy purposes is essentially a combination of accurate inventory making and intelligent forecasting of which of the items are good and saleable and at what price. The area in which this judgment has to be exercised on any given stock varies according to the type of stock and to the skill of those in control of the stock.

Nevertheless this area of subjective judgment does exist and I would like to throw out the suggestion that any statement in trading accounts or balance sheets concerning stock-in-trade should carry with it a statement of the manner of valuation with which the judgment element in the valuation could affect the stock figure. It is true that a margin of tolerance itself is a subjective judgment of the value concerned but it would at least give those whose decisions may be based upon the stock figure, some idea of the values involved.

If it wasn't for the fact that boards of directors and auditors require a final stock figure quickly, it would indeed be possible to reduce this margin of tolerance, because many of the provisional decisions as to whether stock is saleable and at what price, will be proved justified or not by the time the person or persons making the valuation are protected against illegitimate pressures. The degree of hindsight thereby introduced into the valuation of stock at the financial year end will undoubtedly be more accurate and acceptable stock valuation which shareholders and investment analysts can base their assessments.

J. E. Blackwell,  
Twin Oaks, Prestbury Road,  
Wilmston, Cheshire.

## Plumbing in France

Sir—May I add a footnote to Mr. Miller's letter (August 17) on Plumbing in France. In Paris earlier this year, while discussing a "plumbing" job for a large scale of water in the (11 inch to 20 inch diameter pipes in stainless steel), we had occasion to refer to the guide issued by the French Bureau of

Standards. The 1969 version described metric sizes only while a later edition contained metric plus British Standard nominal bore and, believe it or not, it was the latter system with all its eccentricities that our customer finally selected.

Mervin Thomas,  
Welding Technical Services,  
Kings Norton, Birmingham 30.

## Publish and be praised

Sir—Mr. Emmerson (August 18) has completely missed the point and convinces me that my letter of August 13 was well worth writing. The New Immortality concerns iniquitous bank charges. It is the formula which demands an average daily balance of £500 on current a/c to support an average of 18 entries a month which I wish to highlight. There is such a vast difference between what used to be considered a "reasonable" balance and this new penal figure.

Your correspondent is smoke-screening when he compares bank charges with payments to solicitors, accountants etc. The difference between these professional advisers and banks is obvious—except, apparently, to bankers. Solicitors, accountants etc., using entirely their own ability, training and experience in servicing the community and their reward is the fees they receive in direct payment, commensurate with the services rendered.

A bank, on the other hand, is just a shop, in a commodity money (your money and my money to boot!). It buys (that is, borrows) at low prices and sells (that is, lends) at high prices and the difference is its profit.

Northolt was chosen four years ago as the site for a "national" exhibition centre but was finally abandoned amid much frustration in January, 1970, when the Government switched support to Birmingham's plan to establish a new "National Exhibition Centre" at Edgbaston. Since then this project has been intensively promoted by the Government and to the tune of £70,000, but all is now in the balance again following the Northolt revival.

A dealing with the Minister for the Environment, Mr. Peter Walker, on the recent public inquiry in Birmingham will now be meaningless until Northolt's inquiry is over, perhaps in six months time, and whichever way that decision goes the funds meant for the necessary support improved quotations on the Stock Exchange, and now want to revise their ideas about reasonably maintained accounts, then they should come clean and say so. They should now pub-

licise the scale of contributions towards their book-keeping costs which they want from their customers in future, and give customers a chance to shop around or adjust their unprofitable banking habits. To let customers continue in the same old way, believing that the more business they give their bankers the more they respect their customers, is their respecting every six months at ever-increasing rates just will not do!

As private individuals bankers would be among the first to complain if insurance companies, department stores, tailors, garages etc., started charging them specifically for their book-keeping. And these traders don't use our money as stock-in-trade to run their businesses.

It is certainly no defence of the banks and their iniquitous scale of charges for Mr. Emmerson to ask "What is to be done to obtain a service free of charge?" We all know that nothing in business is free, the test is reasonableness. Bankers survive on confidence; they will destroy it by being too greedy and by trying to disguise their avarice in a column of figures twice a year.

N. Haywood Nelms,  
120 Drayton Court,  
Drayton, Gwent, SW10 9RQ.

## Gatwick for exhibitions

Sir—With the announcement of a public inquiry into the plan for an exhibition centre at Northolt one wonders how much more time will be lost, how much more public money spent, and how many more Government decisions taken before new exhibition halls finally get built in this country.

I am working recalling that Northolt was chosen four years ago as the site for a "national" exhibition centre but was finally abandoned amid much frustration in January, 1970, when the Government switched support to Birmingham's plan to establish a new "National Exhibition Centre" at Edgbaston. Since then this project has been intensively promoted by the Government and to the tune of £70,000, but all is now in the balance again following the Northolt revival.

A dealing with the Minister for the Environment, Mr. Peter Walker, on the recent public inquiry in Birmingham will now be meaningless until Northolt's inquiry is over, perhaps in six months time, and whichever way that decision goes the funds meant for the necessary support improved quotations on the Stock Exchange, and now want to revise their ideas about reasonably maintained accounts, then they should come clean and say so. They should now pub-

Northolt Airport, and I accept that site as being the best, but there still remained the problem of finance.

This problem is by no means solved, as Mr. Mahoney implies in his letter (August 13). £21.5 million is a small sum to find for exhibition centre or indeed any commercial development, the very least £11.5m. Institutional funding will be needed, and for the scheme it stands this is a very tall order. From the evidence of the last twenty years or more it is clear that there is an immense, unmet demand for a high-quality purpose-built exhibition centre in the London area. Northolt is not a natural exhibition site. It just happens to be the only area big enough for the purpose in Greater London but as the residents of Hillingdon will make abundantly plain this is no reason for turning it into a showground. A more suitable site exists outside the GLC area, and probably better than Gatwick, which has been repeatedly put forward for development, ideal for a sea visitors, which will have the least impact on the environment and will cost much less than Northolt. A scheme this site could be operational years before the necessary facilities are provided at Northolt.

There is still time to choose the best site for a new national exhibition centre. D. G. A. Shillcross,  
32a The Drive,  
Hove, Sussex, BN3 3JD.

## Purchasing profits

Sir—Your correspondent Long (August 18) surely has his own argument, for in graphs 1 and 2 he refers to the improbability of a buyer's expert in all fields and to the knowledge of a supplier. In paragraph 3 he refers to a reluctance to deal with a reluctance to deal with a status, then he cannot be far from the fact that a buyer is prepared to pay a premium for a large supply. In paragraph 4 he refers to a reluctance to deal with a status, then he cannot be far from the fact that a buyer is prepared to pay a premium for a large supply. In paragraph 5 he refers to a reluctance to deal with a status, then he cannot be far from the fact that a buyer is prepared to pay a premium for a large supply.

It may be unwise to say, as Mr. Allan's analysis assumes an increase in 10 per cent is achieved extra cost. If a 10 per cent increase is obtained, extra cost, the sales price, either too large, or not pulling his weight, not require a large buy to save money, it requires buyers, of which there is sufficient in industry. C. F. Huebner,  
31 Queen Anne's Gate,  
Westminster, S.W.1.

Stepping up  
Gas Corporation  
whisky exports  
to Japan

TAMATED Distilled Products won a contract to supply whisky to Japan which will be the group's exports there for the first time.

Focal Displays of Nippon has won an order worth about £150,000 for whisky to be supplied to Japan which will be the group's exports there for the first time.

The units will be operated by the Glen Scotia distillery and show the latest for accessories including wiper blades, electric tune up kits, spark filters. This is the export order of this

London Chamber opens  
EEC display

THE LONDON Chamber of Commerce and Industry opens a display of literature and information about the Common Market to-day as the first step in its campaign to make industry and commerce more aware of the problems and potentialities of entry into the Six.

The display, which goes on until September 30, in the chamber's library at 69, Cannon Street, E.C.4, has been put up with the help of the banks, the EEC embassies, the British Government and the Commission itself.

## BBC 1

11.25 a.m. Cricket: Third Test Match, England v India. 1.20 p.m. Watch with Mother. 1.45 News. 2.10 Cricket: Test Match, England v India. 4.40 Jackanory. 4.55 Canadian Journey with John Travolta. 5.10 News. 5.15 The Canadian Continent. 5.20 Belle, Sebastian and the Horses. Part 12. 5.34 The Adventures of Parsley.

5.50 News. 6.00 London This Week. 6.20 Henry's Lucy. 6.45 He Said, She Said. 7.30 Z Cars. 7.50 The Goodies. 8.00 Panorama. 9.00 News. 9.10 News. 9.15 News. 9.20 News. 9.25 News. 9.30 News. 9.35 News. 9.40 News. 9.45 News. 9.50 News. 9.55 News. 10.00 News. 10.05 News. 10.10 News. 10.15 News. 10.20 News. 10.25 News. 10.30 News. 10.35 News. 10.40 News. 10.45 News. 10.50 News. 10.55 News. 11.00 News. 11.05 News. 11.10 News. 11.15 News. 11.20 News. 11.25 News. 11.30 News. 11.35 News. 11.40 News. 11.45 News. 11.50 News. 11.55 News. 12.00 News. 12.05 News. 12.10 News. 12.15 News. 12.20 News. 12.25 News. 12.30 News. 12.35 News. 12.40 News. 12.45 News. 12.50 News. 12.55 News. 1.00 News. 1.05 News. 1.10 News. 1.15 News. 1.20 News. 1.25 News. 1.30 News. 1.35 News. 1.40 News. 1.45 News. 1.50 News. 1.55 News. 2.00 News. 2.05 News. 2.10 News. 2.15 News. 2.20 News. 2.25 News. 2.30 News. 2.35 News. 2.40 News. 2.45 News. 2.50 News. 2.55 News. 3.00 News. 3.05 News. 3.10 News. 3.15 News. 3.20 News. 3.25 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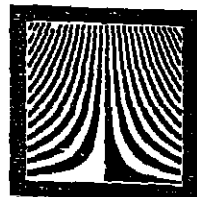












# The Technical Page

EDITED BY ARTHUR BENNETT AND TED SCHOETERS

## RESEARCH

### Low energy forming

**SUPERPLASTICITY** in a number of metals and alloys is no longer just a laboratory phenomenon. It is being applied on a production-line basis to the manufacture of difficult shapes using far lower pressures than would normally be associated with a metal forming operation.

IBM engineers at Endicott, near New York, have been experimenting with superplastic metals for several years and have successfully established the techniques which enable this characteristic to be used in the factory. Certain alloys, it has been known for some time, will stretch like plastics or glasses under relatively low heating and pressures. IBM has found they can be forced into quite complex patterns and when released from the mould will hold the required shape without springing back.

Low-forming forces of the order of 30 lbs are common, which means that several parts can be made simultaneously. The tooling materials are relatively low cost mild steel, ceramic or graphite, and only one-half die sets are needed rather than the usual matched patterns.

One complex part now being made from a zinc-aluminium alloy is worked at 600 degrees F. It is a rather intricate bezel frame for a cathode ray tube and it has an integral attachment flange at the rear. It is shaped by applying air pressure to one side of the sheet of metal, stretched over a die cavity.

The part is formed within a minute and the part remains in the mould for a further four minutes to undergo a strengthening heat treatment. Preparation of the mould took six weeks or about a quarter of the usual time.

Other parts being made on a routine basis are a slotted lamp cover and a heat exchanger core, both rather difficult shapes to produce by any other method.

Further details of this work are available from the company at 1701 North Street, Endicott, New York 13760, United States.

## INSTRUMENTS

### Watch on pressure drops

**IMMEDIATE** alarm indication of a drop in flow rate below a preset level is provided by the in-line Rotameter type 2760 flow alarm by GEC-Elliott Process Instruments.

Type 2760 can be used in almost any application that needs constant monitoring of low flow conditions and is particularly suitable for cooling water circuits, such as those of large radio transmitting valves. The alarm is of simple design, is easy to install and requires a minimum of servicing. A simple quick release fixing enables the metering tube to be removed for cleaning without disconnecting the instrument from the pipe-work.

Three sizes of unit cater for any preselected alarm flow rate from 41 to 8250 l/h water. A variety of contact materials is available and special models can be supplied for high pressures, high temperatures and for operation under sterile conditions.

Now, in an instrument to measure use of an electric typewriter, the meter can be re-set by moving its scale. The device will be installed by IBM service men to show when the typewriter has been used enough to require routine maintenance. Curtis Instruments of 300, Kisco Ave., Mt. Kisco, N.Y., U.S., supplies the meters to IBM.

At each maintenance call, the meter is reversed and its sliding scale set so the zero is over the gauging electrode. This gradually builds up, showing the hours of use on the scale. At any point, however, it can be reversed and the scale re-set to zero.

### Measures strain

**THE** range of high-precision foil strain gauges manufactured by Environmental Equipments, Denton Road, Wokingham, Berks., has been expanded by 20 additional types.

Standard linear gauges are now available in lengths from 0.5 mm to 90 mm, and multi-element rosettes, including stacked rosettes, from 1 to 10 mm. The new gauges include a 50 x 10 mm, 120 ohm resistance linear gauge for heavy structures and "on site" applications; a 25 mm dia. four-element diaphragm gauge for pressure measurement; and gauges of various lengths suitable for detecting crack propagation in brittle fracture and fatigue failure investigations.

Selected lengths of linear gauges are available in the foil yield series which enable strains up to 30 per cent to be measured. All gauges are encapsulated with short lead wires attached. The company supplies a full range of strain measuring instrumentation.

## SERVICES

### Underground high pressure gas storage

**COMMISSIONING** of the most up-to-date gas storage plant in the U.K. is expected in November. Located on the edge of Biggin Hill airfield in Kent, it will have a storage capacity of 10m cubic feet at a pressure of the order of 1,000 p.s.i. When completed it will have cost over £1m.

From an environmental point of view the chief virtue of the system is that it eliminates the need for the ugly gas holders that have for so long been a dominating feature of both town and countryside. At Biggin Hill, the South Eastern Gas Board secured some 20 acres of farmland for its project and most of this will be restored and used once more for farming.

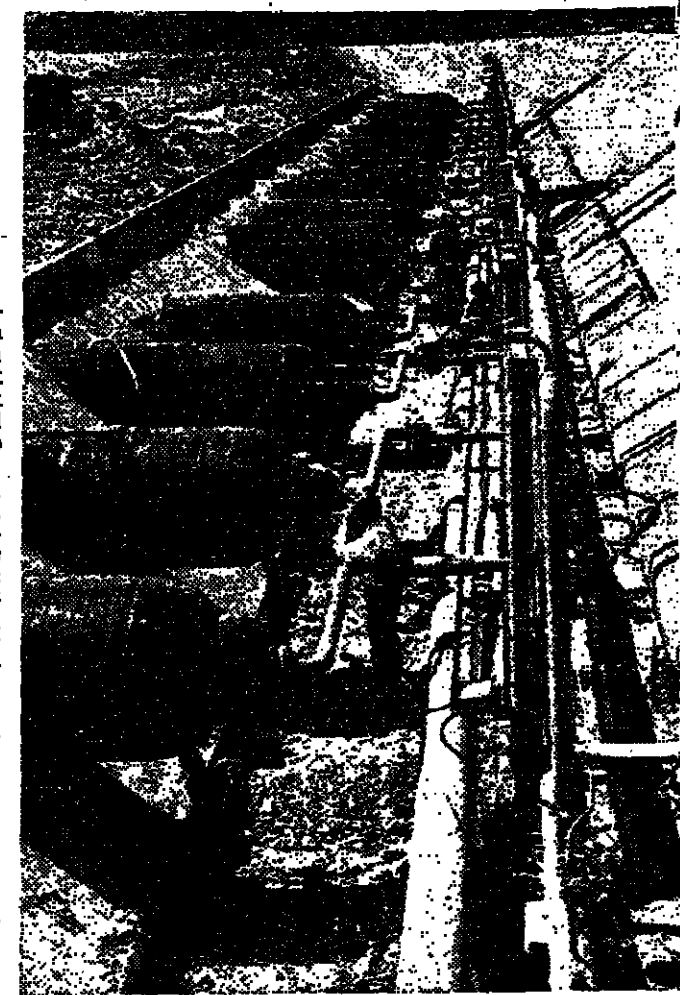
The storage system consists of about three miles of 42-inch diameter pipes laid underground. There are 17 lengths, each 1,040 feet long, laid with a slight fall of about 15 feet in each length in parallel lines and terminating in headers which either carry the gas to the pressure let-down units or bring in gas from the compression stage for storage.

Town gas for storage will come from the 12-inch diameter outer London main operating at 100 to 180 p.s.i. about 2½ miles away while a second source of supply, which will be used after conversion to natural gas, has been completed, will be the 18-inch diameter supergrid running from the Isle of Grain in north Kent to Hooking in Surrey and about two miles away. This source will be used after conversion to natural gas.

Storage of gas will be from inlet pressures of 100 to 180 p.s.i. and this supply will be compressed to fill the storage pipes by means of large compressors driven by 2,000 h.p. Brush electric motors connected to an 11 kV power supply. Electricity will normally be used in the off-peak period and the annual bill for power will be about £40,000.

Only two men will be needed to run the system and operation of the whole plant will be controlled from a central console. However, the South Eastern Gas Board is already looking to the time when it will operate the plant from its central control room several miles away in Croydon. Mr. David Woodall, the Board's area controller, told the Financial Times: "If this system proves as successful as we believe it will be, then we shall go ahead with another installation."

The main contractor for the Biggin Hill project is Humphreys and Glasgow with Sir Robert McAulpine as sub-contractor. Work on the site began in July last year.



The ends of the storage pipes of the South Eastern Gas Board's underground system at Biggin Hill, Kent, project into a concrete-lined trench. As can be seen here, the pipe ends are closed by high-strength steel domes which connect with the main supply header and through which they are linked to the gas compressing and pressure let-down equipment. This trench will eventually be roofed over.

## Gas laser aloft

**OPTONICS** branch of U.S. Air Force Avionics at Wright-Patterson Air Force Base, Dayton, Ohio, has given Honeywell a U.S. \$98,000 contract to develop a compact 100-watt carbon dioxide airborne laser.

To be built at Honeywell's Systems and Research Centre, Minneapolis, will operate on a single gas fill, eliminating need for bulky bottle or pumps normally used with a laser of that output power.

The 12-month contract calls for design, construction and test of the unit, which is expected to weigh less than 50 lbs. It is for possible use in high-performance aircraft for reconnaissance application in a new approach to active ground illumination.

Dr. Hans Mockler at Minneapolis has been a pioneer in development of sealed-off lasers. A ten-watt system he built holds an operational record of close to 10,000 hours with little loss of power. This is about three times previous systems.

## Calibrating electrolyte

**ELECTROLYTIC** meters to measure current flows are common enough but they are inflexible—there has been no easy way to set them back to zero. Since they work on the principle of electroplating and a current removes metal from one electrode and transfers it across an electrolyte to build up another, the only way of going back to the original position was to reverse the polarity.

Selected lengths of linear gauges are available in the foil yield series which enable strains up to 30 per cent to be measured. All gauges are encapsulated with short lead wires attached. The company supplies a full range of strain measuring instrumentation.

## Temperature control

**SOLID-STATE** indicating temperature controllers from Eurotherm are self-contained for up to 25 Amp output through relays or thyristors. The units are of three-term control action type and have a variety of optional output modes to cater for virtually any industrial application that a designer could require. There is a dual-output model for

heat-cool control of plastics machines. The scale is 400 mm and the controls are fascia mounted behind a lockable door. The instruments accept thermocouple inputs and thermocouple break protection and automatic cold junction compensation are fitted as standard.

From its Broadwater Trading Estate, Worthing, Sussex, has been expanding rapidly, not only in the U.K. but also into countries overseas. Subsidiaries have been set up in Germany and Switzerland, following the establishment last year of a bridgehead in the United States.

The company now is established in most European countries, Australasia, Japan and South Africa. It will be in full production of the new range by September this year.

measuring 33 inches by 18 inches by 10 inches deep. Each carrier is numbered, and the three tray positions are coded A, B, and C. The tray No. 658C always refers to the lower tray position of carrier No. 658. The carriers are coloured alternatively blue and yellow, providing a capability to operate at half strength if required by using only the yellow, odd numbered, carriers.

The main conveyor which circulates in the order picking areas can move at any speed between 15 and 90 feet/minute, depending on the order requirements for the day; with a total circuit length of 1,500 feet, and at the present average speed of 35 feet/minute, one complete circuit takes 45 minutes. With a total of 600 carriers on the conveyor, this provides the capability of handling 2,400 trays per hour at present, with a maximum rated throughput of 6,000 at top speed. All other conveyors in the system operate at fixed speeds.

The control system Bagshaw designed enables the warehouse manager to adjust the speed of the main conveyor each morning—or at any time during the day—to suit the workload for the day. Details of the orders received are fed into a computer which then issues instructions to the order pickers, giving full details of what items are required, which tray and carrier the items are to be inserted in, and on what circuit of the conveyor.

An optical system is now being installed which will show what circuit number is running at any time; thus many different items from one customer making up one order can all be inserted into the same tray during its circuit of the warehouse; at the end of the order picking area, a supervisor checks each tray to ensure that the contents match the order instructions.

**Compacting waste**

**WASTE** materials generated by the smaller industrial complex, supermarkets, office blocks or flats, can be compacted into multi-bucket and roll-on containers by a disposal unit which can handle over 125 cubic yards per hour. Using a ram pressure holding three order-picking trays

tons the unit will fill containers ranging from 11 to 30 cubic yards and weighing a maximum of 12 tons.

Manufactured by Anchema Bell Lane, Amersham, Bucks, the units have so far been installed in the U.K.

## AUTOMATION

### Drawing at high speed

**INTENDED** for almost any job where computer output lends itself to graphic presentation, the model 482 drum drafting machine has been launched in Europe by the Gerber Scientific Instruments Company of South Windsor, Connecticut.

It is designed for high-speed accurate handling of such applications as verification of printer and integrated circuit board masters, numerical control tape verification, schematics, charts and graphs.

Gerber claims that the system is capable of drawing at speeds of over 2,000 inches per minute, and that its ability to accelerate to this speed in less than 30 milliseconds is the key to its performance.

The system consists of the new Gerber Series 400 magnetic tape control, tailored as an input device, and the model 62 drum system. Input to the control is through an IBM-compatible 800 bpi nine-track magnetic tape transport. The series 400 control uses a Hewlett-Packard series 20 computer with 4k core memory (word size 16 bits). The control console consists of a single bay in which the magnetic tape unit, the computer and the interface are mounted.

Velocity computations for optimum speed control are provided as part of the system's basic software package. The operational software also provides full linear interpolating routines, dashed line generation, and automatic revealing upon detection of a lateral or longitudinal parity error.

The drawing head on the standard system is capable of 30 inches of travel in the Y direction with the two outside pens of a three pen assembly that can draw with liquid ink, ball point or felt tip. In unattended operation Gerber claims that the unit can continuously draw in lengths to 38 metres.

## HANDLING

### Speeds the mail orders

**IN SPITE** of recent depressed conditions in the industry, one of the biggest mail order houses in Britain—Kay and Co.—has just completed a major expansion of its handling facilities to meet increasing pressure of business.

With a floor area of 1m. square feet to be erected, Bagshaw and Co., mechanical handling designers, were called in to advise at the earliest stage, as it was envisaged that the warehouse would be basically automatic in operation.

The main problem was to devise and install a system which would be able to cater for about 35,000 parcels a day—made up of possibly 100,000 items—to be despatched from the warehouse in response to customer orders. All the items are stocked in the warehouse, and any order received is to be despatched within 48 hours.

Goods, coded for identification, are stored in numbered racks on three floors of the six-level building; a Bagshaw ES overhead conveyor circulates around these three floors in turn, supporting carriers of special design at 2 feet 6 inches pitch, each carrier holding three order-picking trays

## PROCESSING

### Filtering the unfilterable

**BECAUSE** a filtration plant clogged too rapidly to function properly the maker experimented with it and discovered a different method of operation which extended its use to solid/liquid separation problems previously considered insoluble.

Briefly, the plant consists of a stainless steel mesh drum (with solid ends) on the outside of which is stretched a nylon monofilament filtration medium, capable of filtering particles of 30 microns.

The drum revolves inside a tank. The slurry flows in at 15 psi at the base of the tank and the filtrate is removed from inside the drum via the hub. Halfway up the drum on the intake side is a cleaning nozzle which removes the solids collected on the filter by entraining them in a small proportion of the slurry.

During use the filter medium is cleaned either intermittently or continuously—it is stated that the whole drum can be progressively cleaned and brought back into use in 4 seconds.

In one particular application for the filtration of fine particles from a water soluble oil solution (machine tool coolant) it was found when operating the filter on an intermittent cleaning basis that the filter medium became heavily coated (or "plugged") in less than 8 seconds, and even on continuous

operation the slurry blocked the filter in 20 seconds. The maker experimented with increasing the drum revolution speed from the standard 2 rpm to 51 rpm, and found the problem was solved—until the customer increased the flow through the filter from 200 gallons/minute to 300 gallons/minute with an increase in the volume of contamination in the liquid.

The maker again increased the drum speed and at 15 rpm the plant was operating successfully. Mr. R. F. Worledge, managing director of the filtration plant maker, Euroflow Systems, Strand

Street, Poole, Dorset, told the Financial Times: "We do not yet know how much it will be possible to further increase the speed of the drum and so tackle even more difficult problems, but from results in the field and laboratory experiments we are now able to tackle the filtration of sludges previously regarded as unfilterable."

Euroflow has fitted the filter with a variable speed drive from the drum, controlled by pressure variations within the filter, so that drum speed is automatically adjusted to provide the correct cleaning rate.

## ANNUAL STATEMENTS

### GRAIGIELEA RUBBER PLANTATIONS LTD.

The Annual General Meeting of Graigielea Rubber Plantations Limited will be held on September 16 in London.

The following are extracts from the annual review of the Chairman, MR. A. W. SCOTT:

Rubber prices showed a marked downward trend during the year under review and notwithstanding the very satisfactory premiums which were obtained for our pale crepe, the profits earned from the company's rubber areas were halved.

In contrast the price of palm oil moved upwards. The company's output is still relatively small but even so oil palms contributed £48,000, equivalent to 24% of the gross profit for the year as against £3,000 in 1969/70.

As a result of the disposal of Johore River Estate, the future boost to our investment income from the Straits Rubber Company shares which were acquired in exchange and the promise made when the carry forward was increased last year.

So far as rubber is concerned it is too early to assess the prospects for the current year but from our young rubber trees of our business are good. Income from our investments in rubber companies should be not less than £55,000 this year, the elimination of a sizeable dividend of 74%.

## URGENT

# To all Truman Shareholders WHY YOU SHOULD ACCEPT THE WATNEY OFFER

## WATNEY HAS MADE THE BEST OFFER

It is worth 30p more per share than the GMH offer.  
It is still worth 15p per share more than GMH would pay even if their bid goes unconditional . . . .

So retain your equity stake in the brewing industry and share in the very strong growth prospects of the merged Watney/Truman group.  
The alternative is to be absorbed by a conglomerate whose future performance is unpredictable

## THE ANSWER IS OBVIOUS:

Follow the advice of the Managing Director and Chief Executive of Truman and three other Truman Directors:

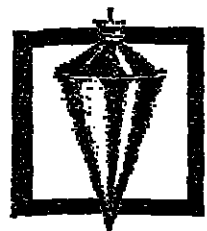
# IGNORE THE GMH OFFER ACCEPT THE WATNEY OFFER

Post your acceptances for the Watney offer NOW

This advertisement is issued to Truman ordinary shareholders by Guinness Mahon & Co. Limited on behalf of Watney Mann Limited. The duly authorised Committee of the Board of Watney Mann Limited has considered all statements of fact and opinion contained herein and accepts individually and collectively responsibility therefor.

هكذا من الأصل





# Building and Civil Engineering

## Bovis in Canadian dredging scheme

OCEAN vessels up to 100,000 tons will be able to reach Quebec City Harbour when the \$28.7m. contract for the deepening and widening of a channel through the St. Lawrence Seaway is completed.

A joint venture of three companies—Bovis Corporation (the Bovis Group's Canadian subsidiary); Marine Industries and J. P. Porter, both of Montreal—has been awarded the contract for upgrading an 18-mile channel through the Seaway north of the city of Orleans into Quebec City.

Passage up the Seaway is now limited to vessels of 45,000 tons or less. In clearing the channel to a depth of 48 feet from its current depth of 35 feet and widening it at various points from 550 to 1,400 feet, more than 14m. cubic yards of material will have to be dredged.

Two of the world's largest suction dredgers, using 36-inch and 30-inch cutter heads, will be used. Three self-powered hopper sows are to be built in Canada for the project at a cost of around C\$1m. each.

## Manchester development

FIRST phase of the Market Place, Central Manchester, redevelopment for CWT (Developments)—a subsidiary of Central and District Properties—is to be undertaken by C. Bryant and Son.

The £2.5m. development covers a five-acre site which includes an extensive frontage on to the north side of Market Street from Marks and Spencer's existing store across Deansgate to the River Irwell and northwards to Cateaton Street.

Besides 33 shops, the development comprises two stores as

well as a 68,000 square feet extension to Marks and Spencer's store. 282,000 square feet of office accommodation is to be provided in four tower blocks and underground parking space for over 700 cars.

Of in situ reinforced concrete construction, the buildings will be faced with exposed white limestone aggregate with aluminium windows.

The focal point of the scheme will be a pedestrian square in which two buildings of historic interest, the Old Wellington Inn and Sinclair's Oyster Bar, have been retained. These buildings were recently raised almost 5 feet by means of hydraulic jacks from their old foundations.

This aspect of the work was carried out as a preliminary to the main contract by Pynforde

(Midlands). The lifting took place in 4-inch stages and in order to calculate the correct pressures, the weights of the buildings were estimated at 147 tons and 701 tons respectively.

Architects for the overall scheme are Cruickshank and Seward and the consulting engineers are Ove Arup and Partners.

## Rotherham steelworks extension

CIVIL engineering works associated with the extension to the existing primary mill building at the Rotherham Works of the British Steel Corporation's Special Steels Division are being carried out by Henry Boot Construction.

The BSC estimates the value of the overall project to be in the region of £1.4m. of which Boot's share is worth £366,000.

Purpose of the scheme is to provide accommodation for new equipment used in the production of high-grade billets. The extended primary mill building will form a billet finishing bay in which part of the billet inspection, dressing and handling equipment will also be installed.

The remainder of the equipment will be installed in a new 800 by 90 foot building. Designed by Tollerfield and Partners, of Doncaster, the project should take 72 weeks to finish.

## Advantages of smaller contracts

SEWERS and drainage schemes worth over £650,000 have been received by Fitzpatrick and Son (Contractors)—part of Limmer Holdings—following the company's policy of concentrating on smaller, but more profitable, engineering works which the company maintains are easier to handle and are not subject to "uncontrollable delays."

Largest of the jobs, valued at £360,000, and awarded by the Rochford Rural District Council, Essex, concerns the main trunk sewer from Hockley to Rochford.

A smaller project covers the construction of a sewer at Myatts Fields South Redevelopment. Worth £78,000, it was awarded by the London Borough of Lambeth. Work has recently started on a £200,000 Cowlinge to Stansfield main drainage scheme for the Clare Rural District Council in Suffolk.

## £2m. first stage of Oldbury job

A joint venture of Bryant Holdings and Samuel Properties has been selected to carry out the central area redevelopment of Oldbury.

A planning application is to be lodged next month for the 23-acre project, the first stage of which is reckoned to cost around £2m. About six acres of land are scheduled for private residential development, and it is the developers' intention to produce an interesting layout of low-cost small homes in a landscaped area.

The shopping centre will consist of a Woolco store for F. W. Woolworth and Co., a department store, a supermarket, 26 shop units, an entertainment centre, two floors of office space, 12 two-storey maisonettes, a public house and a service garage.

Parking for around 1,200 cars is to be provided at ground level. Future stages are planned to include a new library as well as new offices for County Borough of Warley departments.

The scheme has been designed by James A. Roberts, of Birmingham, and it is hoped that a start

## Home fires burn to more purpose

WITH WINTER not so far away and many methods of improving the level of comfort in dwellings being promoted in the press, a report just issued by the Agreement Board in its Paper No. 8 compares methods and materials used to fill the voids in cavity brickwork.

Only two different products are examined—water-proofed mineral wool and foamed urea-formaldehyde resin—on the grounds that other materials such as water-repellent glass fibre, polystyrene foam and polystyrene pellets are not in full-scale use "so far as is known."

The water-proofed mineral wool process and the installation of this material is covered by an independent technical approval certificate from the Board. The other material and its process also have been granted a certificate. In both instances, the award applies to one company only.

No doubt exists that, provided the materials are properly applied, the heat loss insulation provided by their use is very water-while. A mean "U" value for the two fills is taken as 0.25 BTU per square foot per hour and degree F. The figure for treated cavity walls drops to 0.1 unit compared with 0.3 for untreated structures and 0.43 for plastered 9-inch solid brickwork.

These figures show a considerable gain over what is possible with other commonly-used

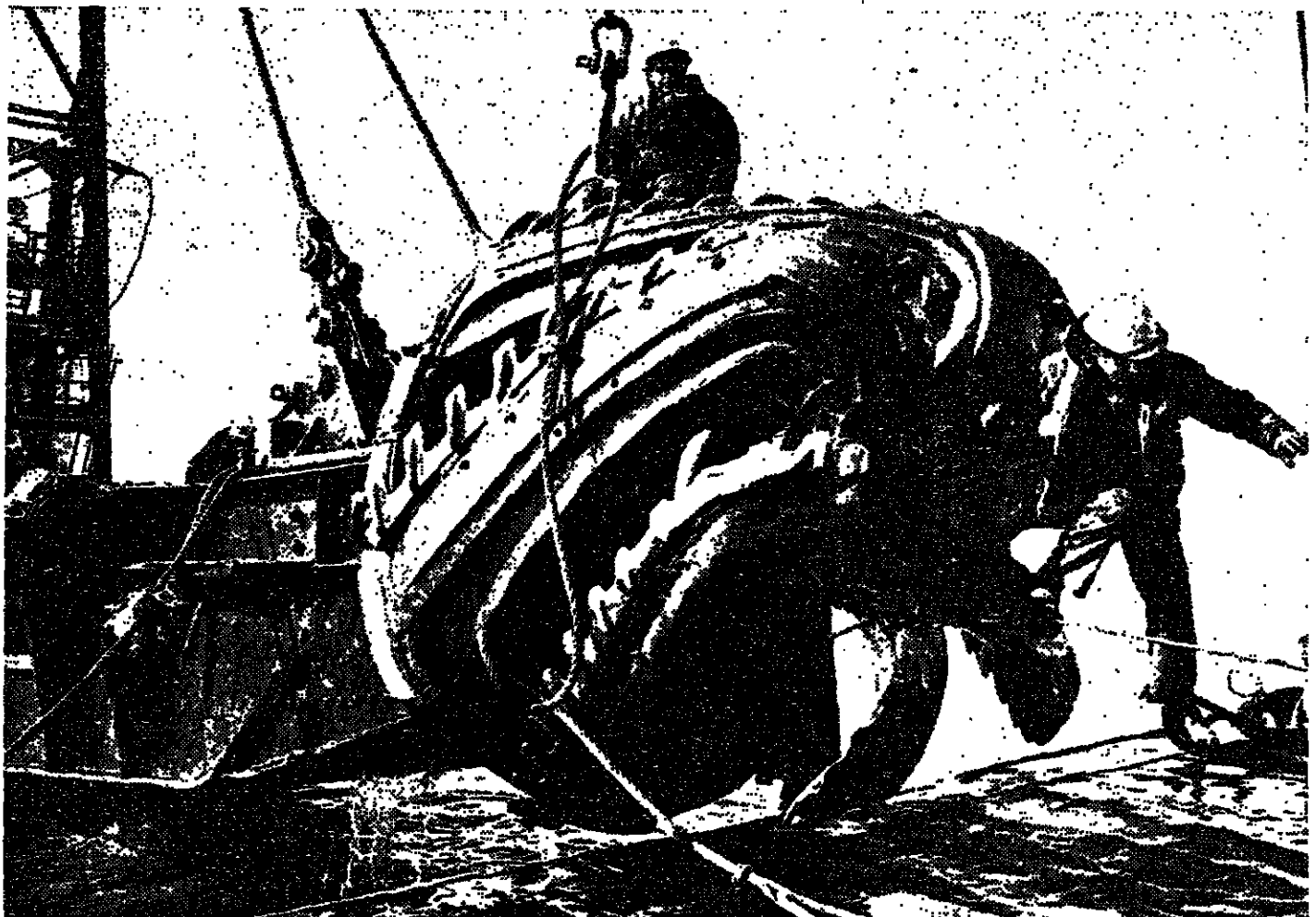
methods of improving insulation such as by substituting lightweight blocks for the inner leaf or by using one or other type of wallboard applied to battens on the inner wall.

When drawing this conclusion from its research, the report makes the point that cavity fill achieves the indicated results at far less cost than the addition of plasterboard. It can be generally estimated as around three to five times cheaper.

An important observation is that the effects on fuel economy must depend on the total construction and especially the proportion of window to wall, insulation in the roof space and so on. The advantages moreover, shows up best in continuously-heated buildings because in the case of cheap housing there is some advantage to be gained in intermittent heating conditions when boards on battens are used as the internal insulator.

One point the report draws attention to is the need to achieve a relatively dense foam free from gross cracking which could penetrate through the foam thickness and cause trouble with moisture penetration.

Mechanical strength of the foam was not thought to be a real test of structural strength of the wall but certainly to the need to avoid a collapse under its own weight. Although only situations up to two storeys had been examined, there was no evidence of risk of failure from this cause.



One of the two suction dredgers which will be used on the St. Lawrence Seaway widening and deepening project. This vessel is owned by Bovis Corporation, one of the three contractors. The picture shows the dredger's cutting head.

## Australian contracts for Costain

LARGEST of the jobs totalling \$3m. recently gained by Costain (Australia) Pty. of Melbourne, concerns the construction of a three-storey shopping complex at Beach Street, Frankston, Victoria, for the National Mutual Life Association of Australia.

The £1.7m. project, designed by McIntyre McIntyre and Partners Pty., involves the use of a reinforced concrete frame and floors with metal deck roofing on light steel trusses. Structural engineers are John Connell and Associates.

At Queen's Road, Melbourne, Costain is to build a 12-storey office block for Guardian Assurance Company under a £1.1m. order. The basement raft and retaining wall were previously constructed by the company under a separate contract.

The company is also to add two floors to the architectural building at the University of New South Wales, Sydney, under a £126,000 order. In addition, site clearance, basement excavation and pile foundations are to be undertaken for a further office block in Melbourne being developed by Centrovital Estates Pty.

## Terminal and car parks

AT Southampton Docks a freight terminal is to be built for Freightliners by Kyle Stewart (Contractors) under a £600,000 contract.

Work includes the construction of crane foundations, the laying of permanent way, roads, drainage and paved areas, and is due to be finished by the end of the year.

A start has been made on the construction of an £820,000 container terminal at Ripple Lane, Barking, Essex, for Container Base (Barking). Included are a steel-framed asbestos-clad transit shed measuring 153 by 47 metres; an amenities building of 80 by 15 metres to be of block and brick construction, and a vehicle repair shop measuring 40 by 20 metres.

Under a £400,000 contract from the Southern Region of British Rail, 30 car parks are to be created at stations in Kent, Sussex, Surrey and Hampshire. The jobs include levelling, drainage, fencing and surfacing.

A further order, valued at £200,000, has been negotiated for the construction of a commuter car park on the site of the old locomotive works at Brighton. It will be reached by a prestressed concrete bridge from Cheapside and the job includes a bridge, roads, retaining walls and drainage. Space will be provided for 900 cars and work should be finished by early next year.

## Filters out the fumes

WITH no increase in size and no reduction in its original efficiency, a new air-conditioning system has been adapted to prevent the smell of diesel fumes creating unpleasant working conditions for personnel in a major car plant.

Thirty CF-4 activated-carbon filter units made and supplied by GKN Filtration have been installed in the air-conditioning system of a three-storey office building at the Rover Company, Solihull, to prevent the smell of diesel oil reaching the offices. Since the carbon filters were installed, not only has odour not occurred, but other objectionable odours have been reduced.

The three-year-old office building, housing engineering staff concerned with vehicle design and production, is double-height with no opening windows, and is designed to provide a congenial and healthy working atmosphere at all times. All heating, ventilating and humidity requirements are monitored and supplied as necessary by sophisticated 60,000 cubic feet/minute air-conditioning system.

From the time the building was first occupied, reports were received periodically of an occasional "diesel" type odour inside the building. The air-conditioning system itself was checked and it was established that this was not the source. Diesel engines associated with heat exchangers located some distance from the offices were eventually blamed—until the odour occurred on a day when all these diesels were shut down. It was finally discovered that the source

was the idling engines of diesel-powered lorries waiting to enter a nearby loading bay.

## Sinking a mine shaft

AT Cobar in New South Wales, Cementation-Thiess Company (Australia) in joint venture with Thiess Bros. Pty. has been awarded a \$3m. contract for the sinking of a 20 feet diameter shaft to a depth of 3,300 feet.

The development is for Cobar Mines Pty. (a subsidiary of Broken Hill South) and the works include construction of the shaft collar, temporary headframe, together with the excavation, concrete lining and equipping of the new shaft.

The No. 3 shaft has been located near the Chesney ore body which has previously been outlined by diamond drilling and will provide access for exploration and development on the 3,000 feet horizon for extensions and/or repetitions of orebodies beneath old workings south of the town of Cobar.

Preliminary works are scheduled to commence later this year and shaft sinking during early 1973 for completion by March, 1974.

The Cementation-Thiess joint venture is currently sinking two major shafts, 3,300 feet and 4,000 feet deep respectively, for Mount Isa Mines at Mount Isa in Queensland.

Cementation-Thiess' contract

## Glass bars traffic noise

RECOMMENDING 12 mm (½ in) thick float glass, single glazed or in a conventional double glazing unit, as an effective barrier against noise, Pilkington's environmental advisory service says independent tests show that the sound insulation performance of 12 mm glass is effective, particularly in the low frequencies, 200 to 500 hertz, where such noise predominates.

In a 50 per cent. glazed facade of brick, concrete or similar material, the average sound insulation for 12 mm glass is 32dB since it is 35dB with the conventional 6 mm air-space double glazed unit using one pane of thick glass. In a 100 per cent. glazed facade, the figures are 29dB and 32dB respectively.

By subtracting acceptable interior noise levels from the external traffic noise levels, the degree of sound insulation required can quickly be estimated. The traffic noise levels accepted are based on Building Research Station Digest No. 38 and figures and are to be incorporated later this year in British Standard CP 153, Pt 2, "Sound Insulation."

## More room in Parliament

ADDITIONAL accommodation at the Houses of Parliament is being created under two contracts together valued at £385,000 recently started by Holland Hannen & Cubitts (Southern).

The larger of the jobs concerns the provision of extra space over the Members' room in the House of Commons. A three-storey steel-framed clipsham stone-faced extension is to be built.

To make way for the new structure, the roof of the existing building is to be removed, but an ornamental ceiling is to

be protected and preserved. Roof demolition and construction of a new floor should be completed during the summer recess of Parliament.

The other project, worth £180,000, involves extensions to the Law Lords' accommodation in the State Officers' Court. This building will also be a three-storey steel-framed structure to be faced with clipsham stone.

Work on both schemes will be carried out while the Houses are not sitting and completion is scheduled for next August.

## In Brief

● GEORGE Wimpey and Co. has been awarded a £74,000 contract by the Borough of Swindon for the construction of roads and sewers at South Dorean, Swindon, where a housing development is to be built.

● FOR the Ministry of Defence, G. T. Crouch is to build 130 houses in Plymouth under a £720,000 order. Of traditional load-bearing brick construction, the houses will be semi-detached and terraced. This contract brings Crouch's work for the Ministry in Plymouth to £2.25m. since 1967.

● PHASE two of the Mordshaw storm water trunk sewer is to be laid by Norwest Construction (Civil Engineering) for Ruscorn

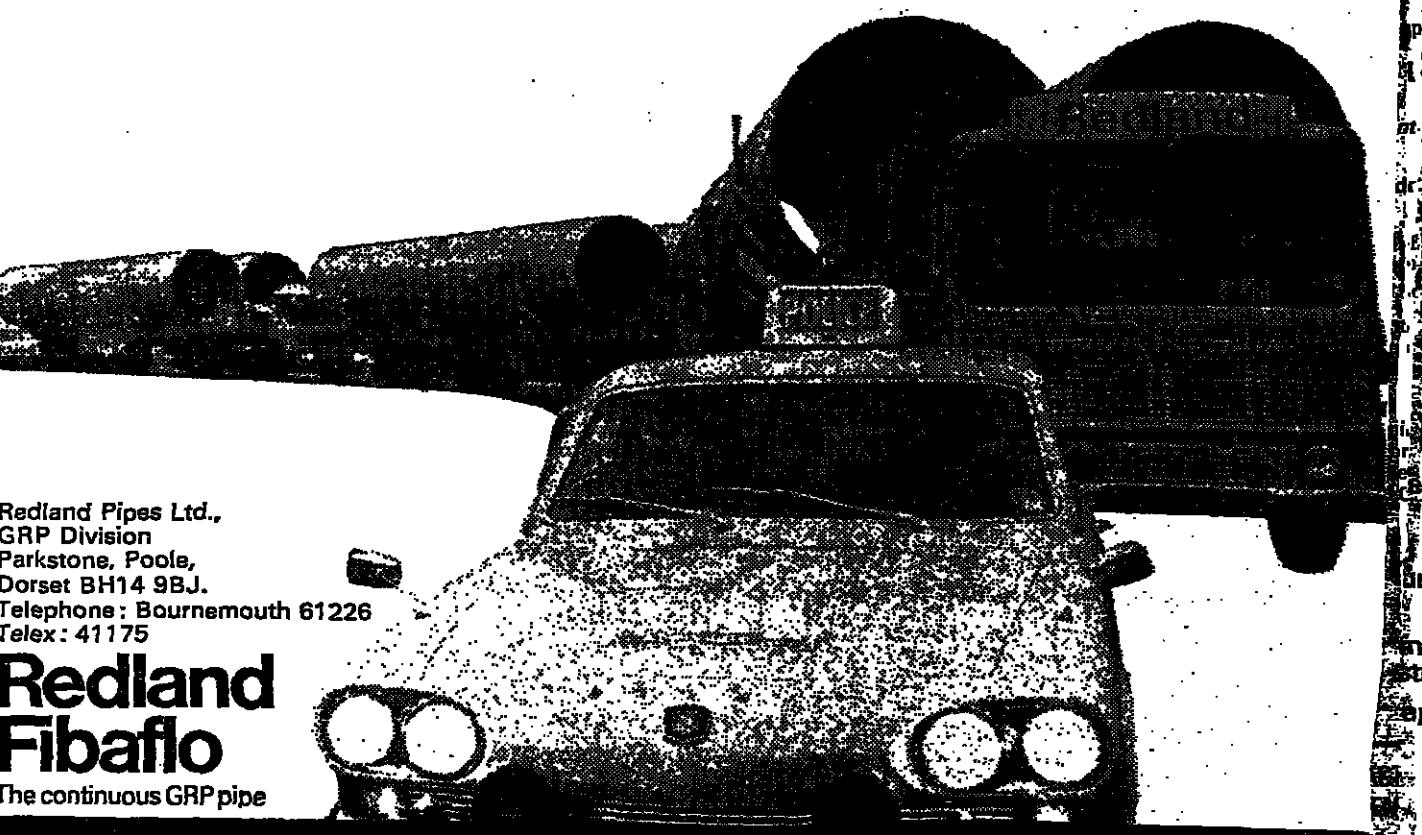
Development Corporation. Valued at £16,000, the contract involves the laying of 750 metres of pipe sewers, 500 metres of smooth bore segment-lined tunnel, 100 metres of hotted segmental tunnel with concrete lining, manholes, cast-iron and reinforced concrete culvert outfall to the existing watercourse.

● LEHANE Mackenzie and Shand has been awarded a £300,000 order to build a store for Tesco Stores at Derby Street, Macclesfield, Cheshire. The building will have two main floors with a mezzanine floor to provide a total area of 4,100 square metres. Completion is due next August, and the scheme has been designed by Inskip and Wylczyński, architects of London.

## There's a big move towards Redland Fibaflo—the GRP pipe that copes with aggressive effluents peacefully

The new Redland Fibaflo GRP pipe is, strength for strength, a quarter the weight of steel. And it lasts longer, because its resin formulation can be modified to resist most chemicals and aggressive effluents.

It can be engineered to fine tolerances in strength and performance. Fibaflo is already being specified for tunnel linings and chemical plants, but there are applications we haven't even thought of yet. You may have a problem we can solve together. Write for the Redland Fibaflo manual FT/RP21.



Redland Pipes Ltd., GRP Division, Parkstone, Poole, Dorset BH14 9BJ. Telephone: Bournemouth 61226. Telex: 41175

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# Metals in Industry

## Financial Times Survey

### Expected revival slow to materialise

JOHN EDWARDS

In the past year or so there has been a happy time for virtually all sections of the non-ferrous metals industry. The effects of the longer-than-expected recession in the U.S. economy have spread throughout the world from Japan to Europe, even to Australia, bringing a general decline in industrial activity and reduced demand for virtually every non-ferrous metal. After the boom years of 1968 and 1969, when demand for metals soared, supplies were short, and prices were high, it was perhaps inevitable that there should be a period of depression. But the downturn lasted longer than anticipated, with no signs yet of the end for revival materialising. The metals industry has had to continue operating in depressed conditions. The result is a dearth of consumer interest in that most metals now in too plentiful supply. The new production planned for happier times comes on stream and has difficulty in finding a market to go to.

Perhaps the best example is tin. Over the years the industry has become used to an average growth rate of 8 per cent per year, which means an increasingly large rise in production capacity has to be created to keep pace with demand and as the total size of the market grows.

was, therefore, quite a shock when the growth rate in tin fell to a lowly 5 per cent, a world basis and in fact

showed a slight decline in the U.S., the biggest single market and heart of the world's aluminium industry. However, producers consoled themselves with forecasts that the average would soon be restored by the expected revival in industrial activity in the U.S. this year.

Now it is apparent that this revival in demand has not happened and indeed is unlikely to happen for some months yet, and producers have been forced to cut back production savagely to avoid building up unwieldy stocks.

#### Large discounts

In these circumstances price levels, fixed by the producers, have not held firm either. It is openly admitted that large discounts on the published quotation are being given by aluminium producers all over the world, including Britain. where for example the London free market for aluminium is currently around £170 a ton, against the official producer price of £257.2 a ton. For producers this means accepting a lower return at a time when costs are rising sharply and being pushed up still higher by the reductions in output which cancel the benefits of being able to operate at near 100 per cent capacity.

The same pattern of events, with variations, has also hit most of the other major metals. Nickel, which was in such short supply only two years ago, is now suffering from such an

abundance that International Nickel, the world's biggest producer, recently decided to cut its output by 7 per cent. Tin prices have sunk near to the "floor" price of £1,350 a ton set under the International Tin Agreement. Lead prices in London have also had to be boosted by support buying by producers, and the threat of anti-pollution moves forcing the removal or reduction of lead used in petrol has cast a shadow over the future of this metal.

Zinc, one of the first metals to suffer from the industrial recession, is showing signs of a recovery, but only by dint of some huge reductions in output both in the U.S. and Europe forced on producers by the heavy losses being made. In Britain, for example, Imperial Smelting's ill-starred Avonmouth smelter has been making huge losses, and although in this particular case the losses may be excessive there is no doubt that producers elsewhere were suffering badly as well.

In these circumstances, the zinc producers in Europe and the U.S. have virtually been forced to make substantial price increases to stay in business at all, but no one pretends that their problems are by any means solved yet with the inflationary pressure on costs of production.

As usual the trend in copper has been the most complicated and confusing. The continued lack of demand, and destruction of a long period of little change, by consumers, has caused prices

to come crashing down from the peaks of over £200 a ton reached in early 1970 to a low of round about £40 a ton in January this year, but since then prices have shot up to well over £500 a ton before coming back to the present level of around £450. Moreover, stocks in the London Metal Exchange warehouses have built up to an all-time peak of over 100,000 tons.

But the decline in values to below £400 a ton, predicted by some pessimists, has not been realised. This is not so much a tribute to any strength of demand, but rather to shortfalls in output which would normally have sent values rocketing.

Production in two of the main producing countries, Zambia and Chile, is much below previous expectations. Zambia is now feeling the effects of the disaster at the Mufulira mine, one of its biggest mines, and Chile has been beset with all kinds of difficulties, including the nationalisation of the copper industry, which has caused an exodus of skilled management and technicians employed by the previous U.S. owners. Peru, too, has been beset by political and labour problems, hitting output severely.

#### Tales of woe

Despite the tales of woe for the major metals, and their accompanying scrap market, it is the "minor" metals that have suffered even worse from the decline in industrial activity. However, bad conditions may be, there is always a basic demand

for the major metals and a need to ensure a regular source of supply, but this does not apply to anywhere near the same extent with the smaller volume metals.

For example, consumers such as the steel industry, faced with bad times in their business, tend to cut costs, by reducing stocks and purchases of minor metals such as antimony, bismuth, cadmium, selenium and wolfram (tungsten ore) to the bare minimum. The situation is not helped by countries such as Japan, finding themselves holding surplus stocks and dumping them on world markets at cut prices, especially when the metal concerned is a by-product of another metal, as is cadmium of zinc, and when its price does not directly affect the supply-demand pattern.

After a false revival in activity in March this year, prices of most of these minor metals have now collapsed again to rock-bottom levels. Cadmium prices in Britain have been cut several times this year, while July saw the first reduction in the producer price of bismuth for over 10 years.

Wolfram has fallen to the lowest level since May, 1968, despite virtually nil sales by China, the world's biggest producer, and free-market antimony prices have now dipped below £400 a ton compared with the £3,500 a ton being charged in early 1970.

Once demand does start to pick up it is surprising how quickly surpluses disappear and the impact is quickly felt in metals. On a long-term basis there is no doubt that prices of metals will have to keep trend with production costs if supplies are to be sufficient to cope with the world's normally insatiable appetite for the resultant products.

### Lead and zinc begin to recover

By R. L. STUBBS, Director General, Lead and Zinc Development Associations

Lead and zinc consumption, like that of other commodities, is still recovering only slowly from setbacks in a number of countries. However, both metals now seem well poised to move ahead again as economic conditions improve, neither being particularly vulnerable to substitution in their main uses.

At home, membership of the EEC should bring a brisker growth in U.K. consumption. World producers' stocks of zinc, which reached high levels last year, have been falling in recent months. The produce price basis for sales outside North America was raised, after a long period of little change, from £127.95 to £150 per metric

ton in mid-June, 1971, and in late-July the price for prime western zinc was raised from 16 to 17 cents per pound in the U.S., where producers' stocks are falling faster than elsewhere. There are signs of a better balance between supply and demand, with zinc at last recovering from the sharp setback in consumption in 1970, particularly in the U.S., which resulted in several American plants being shut down. As consumption began to slow some producers announced curtailments in output, and more recently the Imperial Smelting Corporation in Britain closed down some of its production units. These developments can

be seen as the first stages in a major reshaping of the pattern of world zinc production. New electrolytic refineries are being built in several countries and it can perhaps be expected that, when these start up, more old plants will be phased out.

Largest importer

The U.K. is the largest single importer of zinc in the world after the U.S. and when it is fully integrated into the EEC it could well draw an increasing proportion of its metal supplies from other EEC countries. However, the enlarged EEC, even taking into account new production, will continue to be an importer and exporter

of zinc metal. And in any case will be largely dependent on imported concentrates for its metal production.

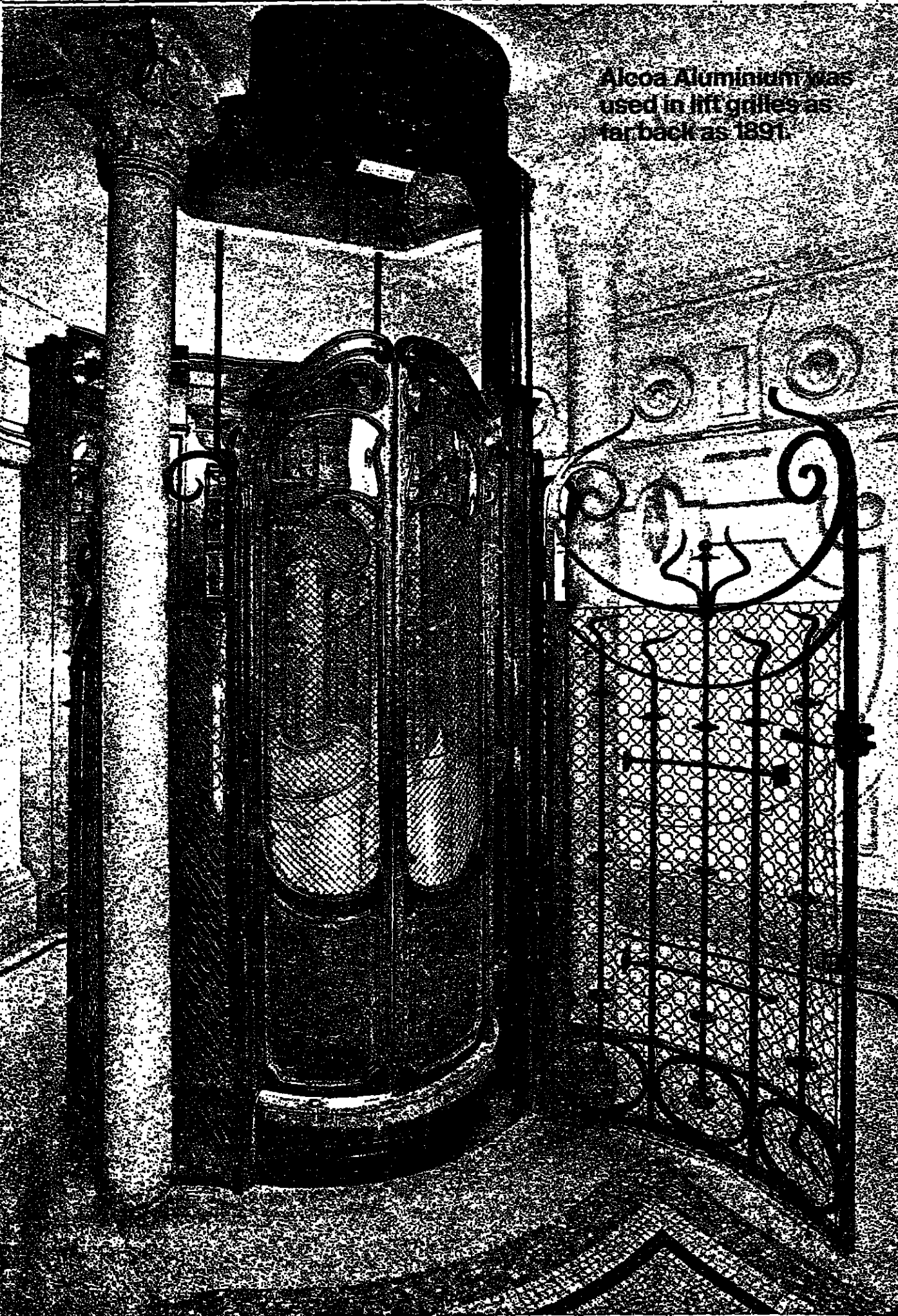
Although zinc has lost little ground to substitutes in recent years, questions are now being asked about the possible effect of the recent increases in price. Nevertheless, these increases were not out of line with those of other commodities and with inflation generally.

Strength in zinc consumption also stems from advances in the technologies for manufacturing its main products. There are many examples, such as the continuous galvanised steel strip that is now supplied with a colour-coated finish as the last

stage in the manufacturing process at steel mills. This new product makes possible more colourful building and is opening up many new applications for an already well-established product. Galvanising of structural steelwork can save maintenance costs by removing the need for periodic painting to prevent rust, and savings are becoming bigger as labour costs rise. New galvanising plants are being built in many countries to coat structural steel.

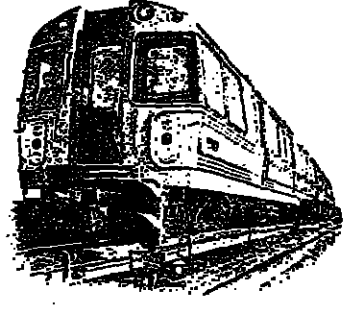
Another important new use of galvanising is in protecting reinforced steel for concrete: a thinner cover can be used with galvanised reinforcement.

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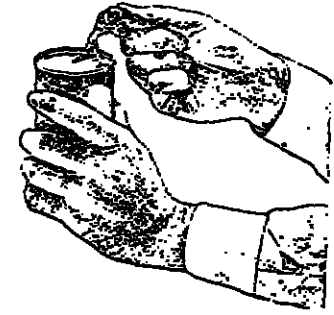


Alcoa Aluminium was used in lift grilles as far back as 1891.

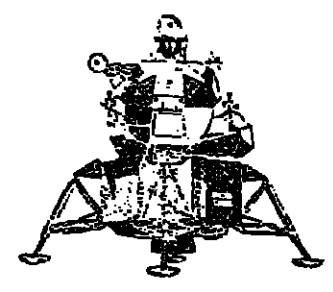
1933 Alcoa helped design lightweight aluminium tube trains for underground transport systems. As the world's largest aluminium company, Alcoa is a vital part of the current transportation revolution.



1960 The convenient tear-off feature for opening cans has been one of Alcoa's most popular developments. Today a wide variety of food is available in containers with these easy-open aluminium tops. And for tomorrow we have more exciting packaging innovations coming up.



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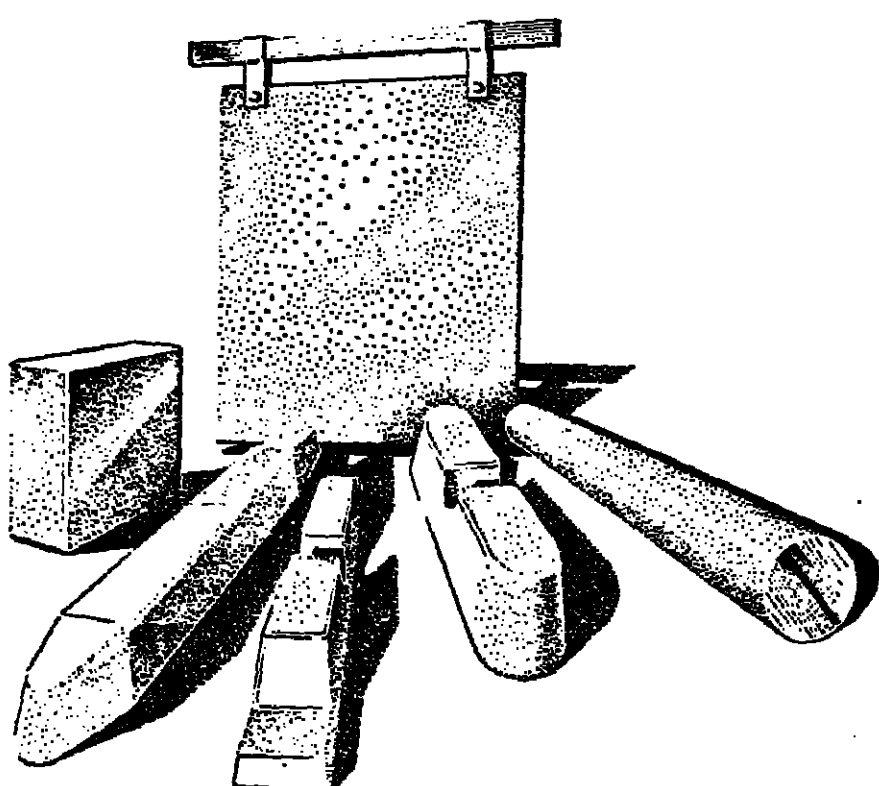
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## METALS IN INDUSTRY II

# Copper loses some markets but finds new ones

By JOHN EDWARDS

Despite the wild price fluctuations and irregularities in supply, consumption prospects for copper are promising since it is still the best material available for a wide variety of uses. There is no doubt that copper has lost a good many markets to rival materials, such as aluminium and stainless steel, but it is constantly finding new outlets and indeed recapturing old markets when prices return to more reasonable levels.

In marginal areas, including certain sections of the electrical industry and building, the various unpredictable rises and falls in the price of copper do tip the balance against it in favour of a steady price material, with assured supplies, but in many applications copper has so many natural advantages that consumers are prepared to suffer the trials and tribulations of erratic supplies.

### Scrap value

One big advantage enjoyed by copper is its relative indestructibility, allowing it to be constantly re-used, which means that its scrap retains a high value in relation to the price of the primary material. Thus while an offcut of a stainless steel tube, for example, is worth little or nothing, the same offcut of a copper tube is saleable and goes back into the scrap cycle. The same applies to many of the copper alloys, such as brass, bronze and cupro-nickel.

In the electrical industry the superior conductivity qualities of copper, as well as its ability to be joined easily, means that it remains supreme in heavy electrical generating plant, for instance, and is able to resist the challenge of aluminium in several other areas. Although

electrical engineers have been accused of being too conservative in the past in switching away from copper to the less expensive aluminium, there is an equally strong body of opinion that considers the higher price worth paying for copper since they foresee long-term problems with materials, for example, that do not have copper's resistance against corrosion.

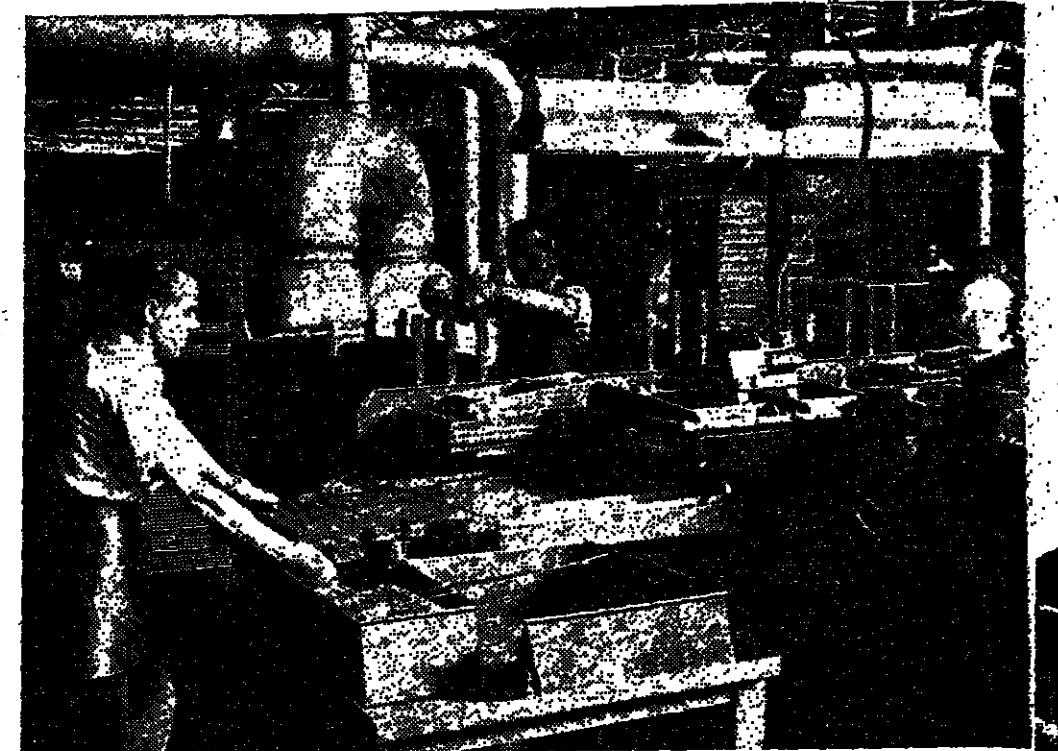
New developments in electrical engineering currently being studied by the Copper Development Association, which is sponsored by copper producers and fabricators, include a method of casting rotor bars in copper which could revolutionise electrical motors, and a new long range waveguide being developed in co-operation with the Post Office.

Another potentially big development is the "mini bore" central heating system, which although reducing the amount of copper used in thinner tubes, should mean an overall increase since the cheaper cost is encouraging greater use of the system in private and local authority housing.

It is hoped that a rolled-form copper window frame may also gain wider acceptance, but as with roofing and other building uses, the price of copper at a particular time is the key to whether or not it is substituted by a rival material.

Copper's anti-corrosion and erosion qualities are also opening up new markets, particularly in the anti-pollution drive, and hopes of making fresh inroads into the chemicals industry have been raised, in Britain particularly, by work on steel tubes with copper linings inside joined by explosive forming.

These tubes, combining the



Copper tubes and fins for motor radiators being loaded before soldering.

strength of steel with the qualities of copper, are not new but progress has been made in Britain to produce tubes with much wider diameters and longer lengths so the range of application can be considerably increased. The quantity of copper used in these tubes is quite considerable.

In the U.S. another big potential market being developed is copper-nickel hulls for boats. Tests on what is claimed to be the world's first barnacle resisting copper-nickel hulled shrimp boat are reported to have been very successful and the way could be open to making similar

hulls for larger vessels, such as oil tankers.

In the road transportation market, research is going on into using copper's heat dissipation qualities in disc brake alloys and providing better wear resistance for carburettors. A different, smaller, version to replace the traditional brass radiators is also being developed, partly to resist competition from aluminium, although copper producers claim the superior welding qualities of copper makes it far easier to install and repair brass radiators.

However, many of the proposed developments will depend very much on whether supplies available are adequate and assured, and consequently prices are kept at a reasonable level.

Unsurprisingly, the future supply position, and the price fluctuations, have been an important influence in holding back copper consumption back to a growth rate of less than 5 per cent. annually, far lower than that of aluminium or nickel.

But for the moment at least the prospects of plentiful supplies look reasonably encouraging.

The avoidance of a prolonged strike by U.S. copper workers has removed one uncertainty. Although there are grave doubts about production in Chile, which has been hit by political and technical difficulties, these difficulties are occurring at a time when demand is a low ebb, and there is a hope that normal output will be resumed when the industry settles down again. Meanwhile, several new projects in the rest of the world, with Sougaville in New Guinea being a notable example, are output expansion in existing areas like the U.S., Canada, South Africa, the Congo, and Australia should ensure that supplies available are sufficient to keep pace with a faster rate of growth in demand.

Given that supplies are adequate it should follow that prices remain more stable at a reasonable level although they will need to be adjusted to the higher costs of production eventually. But having said this, the copper market has a nasty way of making even the most soundly based predictions look foolish.

## Lead and zinc—(Cont'd.)

Continued from previous page

ment without fear of rust staining or spalling. Much of the reinforcement to be used in the new National Theatre on London's South Bank will be galvanised, and other new projects include the reinforcement of concrete tide barriers for sea defences in the West Country. Die-casting too is advancing, with greater emphasis on automatic production and on methods of finishing that eliminate hand labour. Zinc alloys are more suitable than others for use in automatic die-casting machines because of their low melting point and ease of handling, and this could be an increasingly important factor in their favour in the future. Furthermore, economies are being made by using vibratory finishing to prepare castings for plating, so eliminating hand buffing.

After galvanising, brass is the next largest use of zinc in many countries. Consumption has fluctuated in recent years under the influence of the price of copper, its main constituent. Nevertheless, the properties of brass make it the best available material for most of its established uses and so the scope for substitution is limited.

### Use in petrol

Lead consumption has held up better than that of zinc, but the outlook is being influenced by attacks on the use of lead in petrol, and this could affect the future level of consumption. On the other hand, new campaigns for a cleaner environment could stimulate a greater use of battery-powered vehicles to the benefit of lead.

World producers' stocks of lead are still high but like zinc they are beginning to fall. During 1970, the price of lead declined sharply, both on the London Metal Exchange and in the U.S. on the LME from \$137.5 to \$117.2 per metric ton and in the U.S. from 16.5 cents to 13.5 cents per pound. This year the LME price has declined further to around \$108 per ton, but the price in the U.S. was raised by 1-1 cent at the end of June.

At present there would appear to be little change taking place in the world pattern of supply for primary lead, but there have, however, been important developments in recent years, in particular the opening up of the new Missouri mines and refineries, which has made the U.S. less dependent on imports. A large part of all lead used is eventually recovered as scrap, a major factor in the overall supply situation. The cycle of recovery varies, but with batteries now the biggest user of lead throughout the world, and with much battery lead being returned as scrap in

a three-year cycle, supplies of secondary lead are growing faster than those of primary.

Lead is fortunate in having batteries as its main use, since the demand for lead starter batteries is inevitably expanding with growth in motor vehicle populations, most cars requiring about four batteries during their lifetime. Also there are very good prospects that the market for lead batteries for driving vehicles of all types will increase steadily. The advantages of electric forklift and similar trucks, fume free and quiet, in factories and other enclosed spaces are already well appreciated. Although battery-driven road vehicles can not as yet challenge the conventional automobile for general use, the possibility that i/c-engined vehicles might have to be banned from city centres in order to reduce atmospheric pollution is stimulating the development of battery-powered cars and vans, and even buses, for town use. Despite talk of new types of batteries being developed, only the lead battery is at present practical for general use, as already demonstrated in Britain for vans delivering milk from door to door.

The lead battery itself is a highly developed means of storing electric power, having steadily undergone technical improvements over the years. Now there is the prospect of sealed batteries, requiring no topping up, becoming generally available for new vehicles during the next few years. These batteries will use grids of lead containing a small amount of calcium instead of the conventional lead-antimony alloy.

### Major market

Anti-knock compounds for petrol to-day take about 350,000 tons of lead a year, 12 per cent. of the free world total. This is a major market in the U.S., where consumption is currently 350,000 tons a year, 20 per cent. of the total refined lead used in that country, and there is also production in Canada and Mexico. Europe's production of lead anti-knock compounds (U.K., France, Germany, Italy and Greece) takes about 80,000 tons a year, 5 per cent. of the total.

For all practical purposes lead additives are essential for the economical production of the high-octane gasoline required for the modern automobiles. Now the question is raised as to whether the lead in automobile emissions has become a hazard to health, or will hinder the development of emission control devices, and there are widely different expert views. In Europe, however, Sweden and Germany have already placed maximum limits on the lead content of petrols. In the

U.S. the Clean Air Act requires a reduction of automobile auto emissions by 90 per cent. by 1975, and most automobile manufacturers maintain that this can only be met by fitting catalytic devices, which will not work with leaded gasoline. It seems probable therefore that there will be a gradual reduction in the use of lead additives in the U.S., but of course for some years there will be many cars on the road designed to use high-octane gasoline, for which lead additives are normally required.

Lead has a wider range of uses than zinc, which is one reason why its total consumption is steadier. All the main uses of lead are well based on its technical properties, and changes in the pattern of consumption take place only slowly. Substantial markets will continue in cable sheathing, lead sheet for building, solders and printing metals and compounds, and there are promising new lead products and applications such as sound insulation, lead/steel laminates, radiation shielding and new organic lead compounds, which although small now should grow in the future.

### Strong growth

Zinc and lead both enjoyed strong rates of growth in consumption in the 1960s. The yearly average for zinc was about 6 per cent, with increases in 1968-69 of 11 per cent. and 81 per cent, to reach a free-world total of 4.14m. tons. Lead consumption grew at a rate of about 4 per cent. a year, and by 5 per cent. in 1968 and 7 per cent. in 1969, to reach a level of 3.15m. tons. The setbacks in 1970, when world zinc consumption fell by 41 per cent. (about 18 per cent. in the U.S.), and lead consumption rose by only 1 per cent., should be seen against the good performance in recent years. World demand for both metals is still at high levels.

However, in the U.K. consumption of both metals has been disappointing in recent years, reflecting general economic conditions.

The U.K. lead and zinc industry, through its well-established associations and by the efforts of individual companies, has been in the forefront of new thinking for marketing lead and zinc and their products and have thus played a leading role in stimulating the expansion of co-operative promotional and technical services throughout the world. This progressive approach to marketing, coupled with international research programmes, and now with the improving prospect for a reasonable balance between supply and demand, place lead and zinc in a strong position to respond to renewed growth in the world economy.

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## METALS IN INDUSTRY III

## Slack period for aluminium

By JOHN EDWARDS

Aluminium producers are caught in a difficult dilemma at present. Unexpectedly poor demand in the past two years, during a period when the U.S. in particular has suffered an economic recession, has created a surplus of supplies. And with the new production capacity planned in earlier optimistic days coming on stream, there is every prospect of supplies continuing to be more plentiful than demand for the next two or three years at least.

In these circumstances a rise in prices would hardly be advisable, especially since aluminium's competitiveness against rival materials is based very much on its relatively low

and stable price. But like everything else these days costs of production are rising inexorably, pushed still higher by the necessity to cut back output well below the 100 per cent. of capacity where costs are cheapest.

Some people believe that the aluminium producers might do better on improving profitability, by charging higher prices and selling smaller quantities, but for the next few years at least the traditional policy of keeping prices as low as possible and selling as much as possible is likely to be followed.

Much depends on how soon the U.S. economy starts to recover, bringing a revival in

industrial activity, but meanwhile aluminium is making strenuous efforts to break into various new markets.

Transportation, including the car industry, is the largest user of aluminium and still offers some of the biggest potential. Aluminium companies claim that research and testing has now overcome past technical troubles with aluminium car radiators, making it price competitive even if copper remains between £400 to £450 a ton. Good progress has been made in the development of aluminium cylinder blocks and also with the all-aluminium engine, which has been used for General Motor's latest subcompact model, the Vega, in the U.S.

In Britain the expected growth in popularity of automatic transmission systems could bring increased demand for aluminium, since their manufacture requires a far bigger proportion of aluminium castings. So assuming automatic systems do substantially enlarge their present 15 per cent. share of the market in the next few years—following the precedent set in the U.S.—a significant new market for aluminium could be created.

Car grilles and electrical equipment are two other areas where aluminium is pressing hard, but it is being challenged by rival materials, especially in car trim where fashion changes can ignore price competitiveness.

Aluminium has won most of the "easy" markets in electricity from the erratically priced copper, so the going is that much harder nowadays. But the development by British Insulated Callender's Cables of the copper-clad aluminium wire, enabling better jointing, has widened the potential scope for further expansion. Inroads are being made into post office telephone cables and railway signals, as well as the domestic wire market.

## Drinks market

In the packaging field aluminium has made great strides in providing the soft top and bottoms for beverage cans with the tear off opener, which has revolutionised both the alcoholic and soft drinks market. But a changeover to the all aluminium can seems unlikely in Britain, particularly, where tinplate is more competitive than elsewhere.

Of more promise is the foil and rigid foil container market, which it is reckoned still has a lot of growth. The increasing use of refrigerators and deep freezing units is continually boosting sales of foil, while the use of rigid foil containers for cakes, pies, ready to serve meals and convenience foods generally is on the increase.

However, probably the fastest growth market for aluminium is in building. Double glazing, window frames, partitions and decorative cladding are just some of the growing uses for aluminium in industrial and private building.

With the three big new aluminium smelters coming on stream in Britain, and pressure from imports building up, there is little doubt the aluminium producers are going to remain under considerable pressure for some time yet. Indeed some sources do not expect any increase in the price of primary aluminium ingots, from its present level of £257.2 a metric ton, for several years.

It is no secret that at the moment the aluminium producers are heavily discounting the official quoted price, reducing it to around £200 a ton on occasions, while on the free market aluminium is trading as low as £170 a ton.

## Futures market

The London Metal Exchange has an ambition to start an aluminium futures market to provide an independent pricing medium and hedging facilities against price fluctuations, but the producers are implacably opposed to the idea while consumers would hardly welcome the kind of fluctuations that make copper pricing and stocks a nightmare. The odds are, therefore, that even if the Metal Exchange does go ahead with the project, it will have difficulty in obtaining sufficient regular supplies to service dealers properly, and trading is more likely to be concentrated among merchants or dealers.

Meanwhile the producers are taking direct action to avoid the burden of too adequate supplies. In the U.S., by far the world's biggest producer of aluminium, all the biggest manufacturers have now cut back their output substantially and have postponed or even cancelled some of the expansion plans scheduled.

But it should be remembered that once industrial activity in the major consuming areas in the U.S., Europe and Japan returns to normal, world output has to rise by an average of 8 per cent. annually to keep pace with consumption. Over the years it has been found that bad years, when the growth rate of consumption falls well below the 8 per cent. average, are inevitably followed by boom years when demand zooms well above average.

A parallel for the aluminium industry is the period from 1959 to 1965 when supplies were in surplus, discouraging further expansion, followed by the boom period of 1965 to 1969 when supplies were scarce. Much the same is expected to happen this decade.

## Keeping pollution under control

By E. C. MANTLE, Deputy Director, British Non-Ferrous Metals Research Association

Present concern about the environment is possibly the first evidence that society is really beginning to bother itself about technology. Hitherto it has accepted the fruits of the technological revolution, on the whole without too much heart-searching. Now society is beginning to think about the consequences. This is happening all over the industrialised world. Many want to get in on the act, and environmental control means vastly different things to different people. Public debate seems to be largely the prerogative of the politicians, ecologists and preservationists. Action must lie mainly in the hands of the industrialist and technologist.

## Global problem

Total pollution, that is, the total quantity of pollutants being pushed into the atmosphere or poured into rivers, lakes and seas, is, of course, a global problem. Ignorance exists both about the quantities and the ultimate fate of many of these pollutants; whether they are accumulating, what their cumulative effects may be. Soon this will have to be tackled internationally, but at present each country is concerning itself with its own immediate problems. Legislation varies considerably, and the degree of enforcement even more. Sometimes apparently severe regulations turn out to be no more than pious hopes where enforcement is concerned. Indeed, it is probably a mistake to promulgate too stringent requirements since enforcement could well cripple an industry. Anti-pollution measures are expensive and almost invariably an added production cost. The remedies can best be sought and the costs borne by a prosperous industry. Encouragement for progressive improvements towards the ideal is likely to be more rewarding than a crusade against industry.

The more moderate approach has in fact been conspicuously successful in this country and great progress has been made

in reducing pollution levels, particularly over the past decade. It is a justifiable claim that we have completed stage one, the containment of pollution; our atmosphere is cleaner and our waters more wholesome.

The non-ferrous metals industry, although certainly not one of the major sources of pollution, has tackled its problems realistically, and the U.K. has a lead in practical achievement over virtually the rest of the world in effluent treatment and in air pollution measures. Heavy metals such as copper, nickel and zinc, while beneficial in small amounts to some forms of life, are toxic towards fish in anything more than trace quantities. Their effects on biological sewage treatment is less marked, although sufficient to make large concentrations unwelcome. The copper industry therefore has for many years had to take steps severely to limit the quantities of these elements released in effluents. Experience gained in the design and operation of effluent treatment plants was incorporated in a Manual published in 1965 by the British Non-Ferrous Metals Research Association, which has been translated into French and German and is recognised as an authoritative book on the subject. The construction of effluent treatment plant is fast becoming a considerable industry.

## Water shortages

Allied to effluent treatment is the question of water conservation. We are impoverishing our resources far too rapidly, and the possibility of severe water shortages faces many industrialised countries. A survey of the non-ferrous metals industry of Europe confirmed that the major water usage was for cooling purposes. This water is only "contaminated" by heat and practically all can be reused after treatment with significant financial savings. Water not only has to be bought, but after all, is waste, and a frequently there is also a pay-reflection on our technical competence.

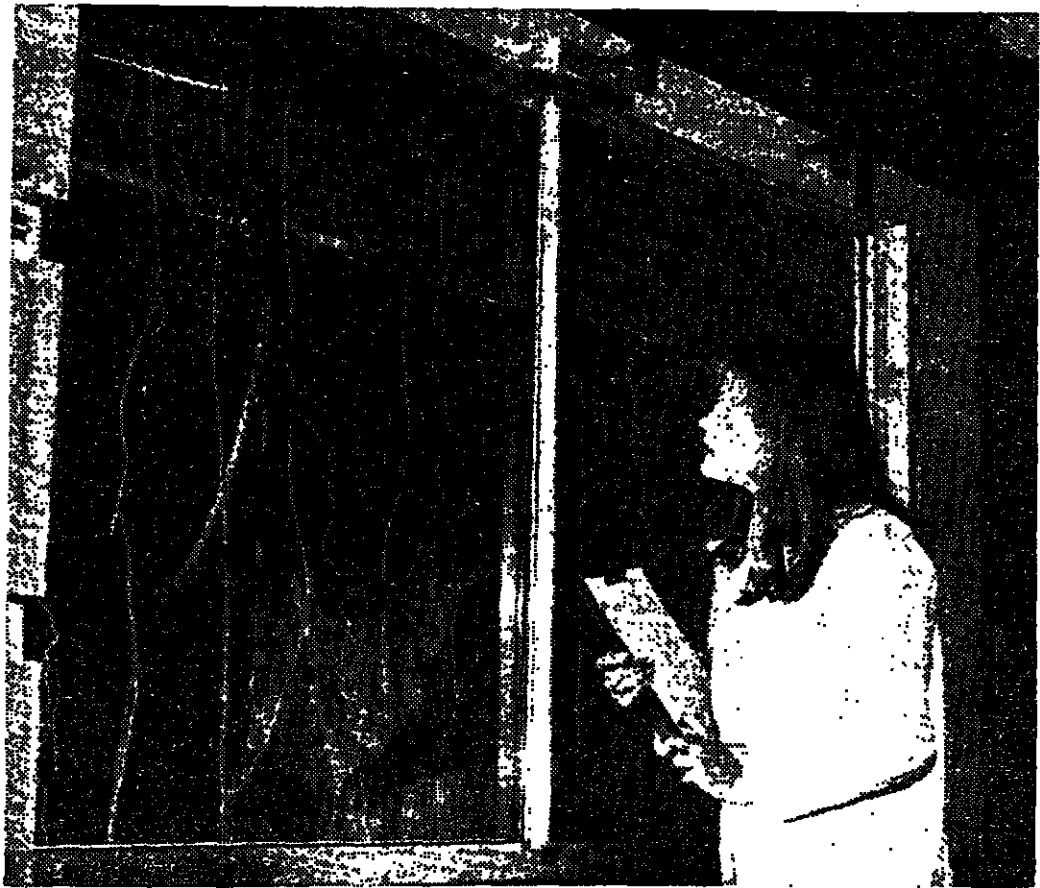
A companion volume to that on effluents has been published on water conservation in the industry, dealing particularly with the design and operation of recirculating cooling systems.

A considerable co-operative effort engineered by BNF has enabled answers to be found for the more important air pollution problems of the copper and aluminium industries. Regard has had to be paid to the effectiveness of the measures, to practicability of operation under works conditions and to economics. Some apparently attractive methods have, in fact, proved impracticable after long-term pilot trials. Close liaison has been maintained throughout with the appropriate authorities, in particular the Chief Alkali Inspector, and satisfactory solutions have been agreed for the major problems, though the search for better techniques continues.

## Close interest

Through its important international membership the BNF has been in a favourable position for keeping in touch with progress overseas. Where alternative approaches are being tested they are being watched with close interest. The BNF has organised a successful conference on "Air Pollution and Water Conservation" in Basle in 1968, gathering together experts from several countries concerned specifically with the problems of the non-ferrous metals industries.

Stage one in the reduction of air pollution has been completed; but clearly there will be a stage two, requiring more stringent measures and necessitating continuing research. Often the answer must lie not so much in more rigorous control of pollution, but rather in seeking new processes inherently less pollution-productive, and this approach is mirrored in current research. Pollution, after all, is waste, and a frequently there is also a pay-reflection on our technical competence.



A horizontally sliding aluminium window undergoing tests at the British Standards Institution's Hemel Hempstead centre.

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## METALS IN INDUSTRY IV

# Research work must be geared to the industry's requirements

By Dr. A. J. KENNEDY, Director, British Non-Ferrous Metals Research Association

Seen against the economic background, the pruning-back in industrial research and development which has characterised the past few years in this country is not difficult to understand. Times have been hard, and R and D has had to take its share of the cuts along with most other things. Unfortunately there is no magic formula for calculating just how deep the cuts should go, nor for distinguishing between what is good and what is bad in these matters: it would be comforting if there were. We can be certain of one thing, and that is that there is no chance whatever of our present technologies, in non-ferrous metals or in any other field, going on unchanged for ever. Changes are inescapable; the real question is how we are prepared to deal with them.

Whatever misguided expenditures there may have been on research and technical development in the past, and whatever we may learn (and ought to learn) from the post-mortems, the fact remains that one way or another we have to earn a living in a technical world. Tough measures to reduce expenditure are one thing, and research could even bloom more vigorously in a somewhat harder climate, but we delude ourselves if we believe that we can get by without it. The issue is really that of fitting R and D successfully into the framework of industrial enterprise, integrating it closely with the life of industry and doing it well. Reading the statistics, this last requirement seems at times to count for nothing in a system where research is often simply measured in terms of expenditure and numbers of people.

The consequences of such recent re-appraisals of research effort have naturally affected all research organisations in one way or another, including the Research Associations. These have, at the same time, been required to face up to the effects of a Government policy which, by holding fixed the total sum available as RA grants, has effectively reduced their value year by year. Different RAs

## Varied activities

Within the context of its industry, research is only a part, albeit a necessary part, of BNF's varied activities. There are times when the only means of achieving an advance is through some systematic experimental investigation, whether this be called research or something else. But the mere acquisition of results is a sterile activity if these are not brought to bear on the particular problems and the particular aspirations of individual companies. The central role of the BNF is that of guiding, smoothing and effecting the implementation of new ideas whether these be in respect of the materials or the processes, equipment and procedures of its industries.

To play this role effectively, the BNF must have an intimate knowledge of the workings of the industries it serves, and a close involvement in their technical and economic life. What is more, it can only contribute to the practical realisation of new industrial developments within its members' works through their co-operation and goodwill. This is one reason why the concept of membership is such a good one. It is sometimes argued in the rarefied academic debates which take place from time to time on what is called research philosophy that collaboration in research is

outmoded, or "against the trend," or "not appropriate" to modern industry. The truth is the opposite. One of the great lessons of recent history—and not just in science and technology—has been that we cannot afford to go it alone, in every possible field and, that when we do, the private gain is rarely worth the private investment.

The dominant reason for collaborating is, of course, an economic one, and those who argue so vigorously for both a cutting down of research costs and a tougher go-it-alone policy are hardly consistent when projects costing, say, hundreds of thousands of pounds need cost and a single member only a fraction of the price. It would be equally foolish to propose that there is no place for commercial in-company research; clearly there is. Every case has to be looked at on its merits in terms of individual companies and projects. The important point is that all the evidence of recent times in the non-ferrous metals field substantiates the view that an organisation like the BNF has a vigorously expanding future, not (necessarily) in the sense of its own size, but in the scope and size of its international membership, the scale of its projects, the value of its advisory and consultancy services, in a sense, a form of contract

## Strong support

Over the last five years, the number of Associate Members (that is, overseas members outside the Commonwealth) has increased from 25 to 42. BNF of 1970, its sponsored earnings from 1965 inclusive had reached £1.2m. This income from sponsored work (£252,500 in 1970) is comparable with that of many sponsored research institutes, and ought to silence those who have been so loudly advocating that RAs ought to seek new ways of funding their researches. They are some years out of date.

The needs of the individual members, in a membership so varied as that of the BNF's are diverse. For some, the information and technical services are of first importance, while for others, the collaborative research programme is of greater concern and interest. All sectors

research with groups of members acting as the sponsors. These projects have all so far been concerned with processes: continuous casting, hydrostatic extrusion, furnace performance, and electrodeposition, among others. Taking the contributions to such projects together with the income from contracts as such (and this contract income has increased from £35,000 to £170,000 over the last five years) the total income from all classes of sponsored work has now reached a level which exceeds the income from the traditional RA sources, that is, from membership subscriptions plus Government grant. By the end of 1970, its sponsored earnings from 1965 inclusive had reached £1.2m. This income from sponsored work (£252,500 in 1970) is comparable with that of many sponsored research institutes, and ought to silence those who have been so loudly advocating that RAs ought to seek new ways of funding their researches. They are some years out of date.

The subscription principle is here highly appropriate, enabling the BNF to offer useful supporting services to its members, and at the same time providing for research and development work of wide benefit to its industries—a good contemporary example of this is its work on air pollution and on environmental matters generally. The ability to take up quickly some exploratory research on subjects of pressing industrial concern is an immensely valuable feature of this "subscription fund." Where appropriate, projects can subsequently be defined and established on a group-sponsored basis, enabling those that want the results of the work to pay directly for it.

## Natural result

The sponsorship system is therefore seen to emerge as a natural consequence of the BNF's purpose, and not as some change in basic policy. The BNF is one of many organisations contributing, in their different ways, to the advancement of the non-ferrous metals industries and to those who use their products. If its purpose within its basic industries can be summarised briefly it is to shorten, cheapen, improve, control and optimise the production routes of its members. In the user field, its purpose is to ensure that existing products are selected and used to their greatest advantage and that new and better ones are not left lying on the shelf unused. It cannot do this through research alone, and indeed where research is best undertaken elsewhere it supports such a move in its own and its members' interests.

The BNF's increasing internationalism is a feature which will certainly continue to develop and will have a special significance if Britain enters EEC. The real nature and purpose of the BNF could not in fact be better summarised than in the title of its next international conference (it holds these every two years, and they are not confined to its members), which is to be held in Liège in October. It is: "Maximising the yield of non-ferrous metals processes."

## Recent debates

BNF's concern is with industrial advancement, technical and economic, and not with research for its own sake, but only as a means to an end.

This is why it views some of the recent debates on how research should be funded as doctrinaire nonsense, based on a philosophy which postulates a "need to do research" as an automatic good thing, and then asks how this improving occupation is to be conducted and funded. There never was a case for such an approach, and no good research ever came of it. The BNF's work derives from the real world of its industries and from the demands made on it by its members. It has a practical and down-to-earth job to do, very much wider than research alone. Indeed, research is not enough, and that is why the BNF is where it is, earning a living in a highly competitive world.

# Nickel remains in plentiful supply

By a Correspondent

The recent decision by International Nickel of Canada, the world's largest producer, to cut back its output by roughly 7 per cent to avoid piling up too heavy stocks illustrates better than statistics the all-too-plentiful supply position of nickel at present.

Equally the same company's decision to go ahead with very costly plans for a huge expansion in output to raise its Canadian capacity alone to some 630m. lbs by 1975 (compared with deliveries of 519m. lbs in 1970) underlines the faith the producers have that demand for nickel will soon be growing more than keep pace with the substantial boost in world production planned in the next few years. The present situation is viewed as a temporary hiatus caused by a slower than expected recovery in the U.S. economy that is not likely to upset the average 7 per cent annual growth of demand in the long-term.

To consumers, the sudden turnaround from years of shortage and rationing of supplies to times of abundance must be somewhat bewildering. It seems only yesterday (it was in fact the end of 1969) that nickel was in such short supply that it was fetching over £7,000 a ton—about seven times the normal price at the time—in the London "free" market.

## Years of scarcity

The acute shortage in 1969 was caused by a four-month strike at International Nickel's Sudbury mine in Canada, and at the neighbouring Falconbridge mine, but the strikes were only the culmination of several years of scarcity which developed in 1966 when the Canadian nickel mines were previously hit by bitter strikes. During this four-to-five year period there is no doubt that the scarcity of nickel supplies, with the companies being forced to allocate rations to consumers, prevented the demand for nickel from building up at its natural rate.

There were increases in consumption, but they were limited by the amount of supplies obtainable, including those bought from the USSR and the U.S. stockpiles.

But in the years of plenty, there is nothing to stop demand building up any longer. And with the aid of technical research and development, often initiated or encouraged by the producing companies, many new markets are being discovered while the traditional uses are also being expanded.

Stainless steel is by far the biggest market for nickel, accounting for some 41 per cent of the record non-Communist world sales of 985m. lbs achieved in 1970, and it is said that the state of the nickel industry can be judged by the progress of stainless steel sales. Using this as a yardstick, present prospects are far from good, with stainless steel sharing the present depression of the world steel industry. But

the potential uses for stainless steel are endless, ranging from cutlery to decorative wall cladding, not to mention kitchen sinks and equipment for the chemical industry—which is why International Nickel confidently predict that the use of nickel in stainless steel alone will jump to 800m. lbs by 1980, compared with 404m. lbs last year.

## Second outlet

High-nickel alloys—that is, alloys of metals containing a high proportion of nickel—are the second biggest outlet (14 per cent of the total) for nickel and one of the fastest-growing areas. The technological age is dreaming up all kinds of new uses for a versatile metal such as nickel, which is corrosion resistant, can be used in high- and low-temperature alloys, and can provide good engineering qualities for manufacturing purposes. Nickel is expected to play an increasingly important part in the battle against pollution in several ways, which include being used in car exhaust systems.

It is also likely to benefit considerably from the anticipated upsurge in the use of nuclear power, with plants requiring more high-temperature and corrosion-resistant materials. The increased use of natural gas as a source of energy, and the need to transport it long distances and store it in liquefied form, is another potential big market for nickel, as is the electrical industry.

Constant efforts are also being made to expand the demand for nickel-containing materials in traditional markets such as plating (car bumpers, for example) and construction, and the chemical, petroleum and marine industries.

Nickel producers are making the most of the times of plenty to put their research and development experts hard to work creating new markets for the future. The battle against substitute materials, such as plastics, aluminium and "minor" metals such as cobalt, which can replace nickel for plating purposes, is also being fought, although one weapon not used so far is price-cutting. Inco, who are the price leaders even to the extent of buying up surplus Russian supplies, have made it plain by the recent cut back in output that this is preferable to price-cutting. It is argued that lower prices hardly increase sales at all and only make it harder to afford the huge expansion

programmes proposed, which are currently costing Inco, for example, some \$20m. a month in Canada.

At the same time, it is also true that there has been only one small increase in the nickel price since November, 1969—blamed mostly on the losses made on the "floating" Canadian dollar exchange rate—and costs have risen steeply since then. Certainly other less powerful nickel producers have felt the strain, but Inco is hardly likely to worry very much about possibly stultifying competition from rival areas with great potential such as Australia.

Inco's distribution method of providing large consignment stocks for some of the bigger consumers, with payment only demanded for the nickel actually used, has provided the basis for reports of price-discounting and, of course, nickel is obtainable at £100-£150 below the fixed producer price of £1,246.5 a metric ton on the free markets in Europe and the U.S.

At the moment, with producers stockpiling surplus supplies and output expansion plans going ahead regardless, the possibility of nickel remaining in plentiful supply for some time yet seems likely. But this could quickly be altered when demand starts to surge again. Moreover, an interesting point to remember is that the Canadian workers' labour contracts come up for renewal again in July next year, and no one can say with any certainty that a strike will be avoided.

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# New welding techniques offer cost advantages

By TONY FRANCE

For industrial fabrication the most commonly used non-ferrous metals are aluminium, copper, nickel, titanium and magnesium, together with their wide range of alloys such as brass, aluminium-bronze and the nickel alloys. Unfortunately non-ferrous metals when heated react with the atmosphere to a greater degree than steel, which makes them more difficult to weld.

Friction welding is one of the few processes which produces successful welds between dissimilar metals. When a really large machine was installed at British Aluminium's new smelter at Invergordon, friction welding made an impact in the non-ferrous world. The machine at Invergordon is used to weld the anode hangers for the smelter lines, providing joints between the massive aluminium bus-bars and the steel anode hangers, producing a joint with a cross-sectional area of over 20 sq. in. in about 1½ minutes. It is estimated that savings of up to £35,000 a year over other methods of making these joints will be achieved.

The cost-saving aspect has aroused interest for other non-ferrous applications, for example, in the manufacture of long phosphor bronze bolts. These are traditionally made by machining from hexagonal bar, but by friction welding a smaller diameter length of round bar to a short length of hexagonal bar (to provide the head) a considerable reduction in metal wastage (as swarf) and in machine time could be achieved.

Titanium is another metal that produces welding problems because it is extremely reactive when heated in air—with friction welding no protective atmosphere is required to shield the weld area, and titanium components of circular section present no problem.

A development in friction welding is a prototype sensing system which will lead to automatic monitoring and finally to automatic correction if any parameter of the machine cycle seems likely to result in a faulty weld. (The Welding Institute has applied for patents on the system.) The prototype device provides control of the friction welding machine by adjusting only two settings—one knob controls the dynamic conditions at the interface, the other the

duration of the conditions for a complete weld cycle. This means that from a simple chart the operator has only to make two adjustments each time he uses a different metal, or combination of metals—changes of diameter do not require new settings, apart from chuck fitting.

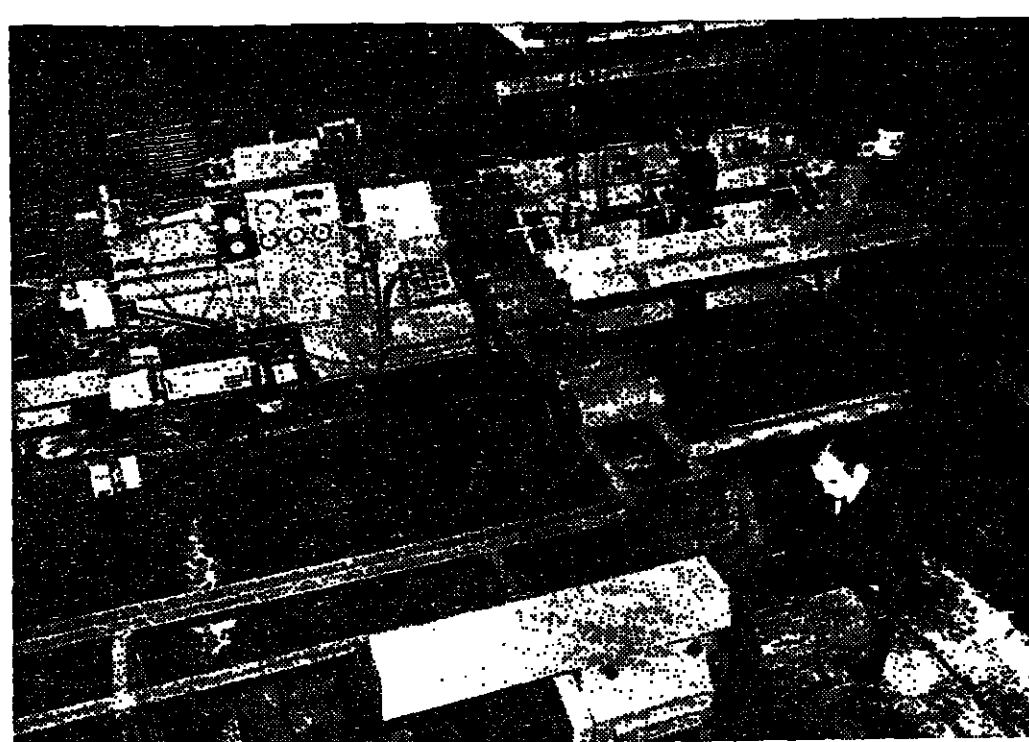
Microfriction welding is on the point of commercial exploitation and many forms and combinations of materials have been welded, including 1 mm diameter nickel-iron alloy pins to 0.3 mm thick nickel-silver cans (for electronic components), and 1.7 mm diameter tungsten carbide drill tips to 1.7 mm diameter stainless steel shanks for dental drills.

## Different approach

These descriptions of friction welding refer only to the conventional or "continuous drive" type. In the U.S. "inertia" or "flywheel" friction welding is widely used, where the kinetic energy of a flywheel being brought to rest is used to provide the energy. An entirely different approach to friction welding has recently been developed in this country in which the longitudinal axes of the two components are made to revolve about a common centre. At the end of the weld cycle, the axes are aligned and forging pressure applied. This approach, called "orbital" friction welding, enables components of other than circular section to be joined, for example, I-section bar up to 1 inch wide has been successfully welded with all faces properly aligned.

Electron beam welding machines are now being made as small, relatively inexpensive, units able to turn out components at high production rates. Metals with dissimilar melting points and thermal conductivities can be joined by melting one of them on to the other, for example, copper to tungsten. Among the items now being welded by this method are beryllium copper anode capsules, and relays with glass to metal seals in the vicinity of the weld.

At the other end of the scale, The Welding Institute is developing an electron beam gun which it is hoped will eventually operate at a 75 kW output—this will weld steel up



A friction welding machine at work producing aluminium/steel anode hangers for the new British Aluminium smelter at Invergordon.

to 6 inches thick and aluminium alloy up to 12 inches thick. Admittedly there are no applications for 12 inch thick aluminium which immediately spring to mind. The Americans have built a submarine in 8 inch thick aluminium, but that was bolted together. The thought of single pass narrow 12 inch deep welds is attractive—and may lead to very thick aluminium pressure vessels for cryogenic chemical engineering applications, or, a more likely application, for welding smelter bus-bars. These are increasing in size and can be of the order of 3 feet by 8 inches in section. Although the electron beam machine would not be a feasible proposition for site welding, it could certainly be used for producing "specials," for example, awkward joints and shapes in bus-bars and connections.

With a high-powered electron beam gun it is possible to obtain a long narrow beam of almost uniform section. This means that it would be possible to weld die-cast sections of a massive aluminium engine block, up to 12 inches thick, completing several welds at different locations (in the same plane) in a single pass. The process could also be used for the multi-layer or composite main structural members of aircraft frames.

## Copper problems

Copper is a metal which, because of its high heat conductivity, is difficult to weld. It poses problems of high pre-heat temperatures, and welds are subject to lack of penetration defects. Both these difficulties are overcome by electron beam welding, which can easily weld ½ to 1 inch thick copper, about the maximum thickness encountered in chemical engineering and electrical applications and of course the most difficult to weld by conventional processes.

Other possible applications for electron beam are for welding the high-strength aluminium/zinc/magnesium alloys developed for armour and military bridges; and for a new approach to fabricating ship's propellers in aluminium bronze. The spinner and the blades could be cast separately, and the blades welded at the roots, using single passes up to nine inches deep. This could simplify fabrication problems for big propellers.

Pulsed tungsten inert gas welding, a process invented in 1960, is attracting increasing attention among non-ferrous metal fabricators because of the very accurate control of both penetration and metallurgy that it offers. In its simplest form TIG pulsed arc welding is a pro-

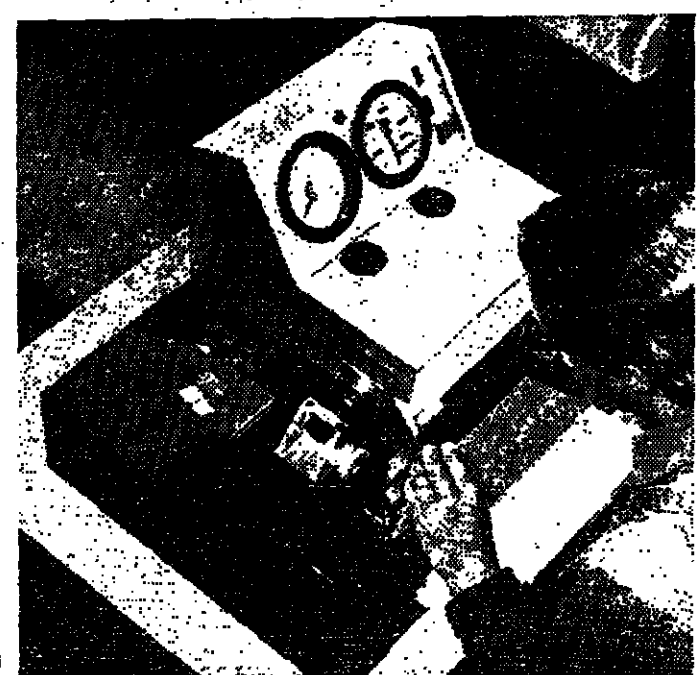
cess in which the arc current alternates between two levels, for example, 130 A and 5 A, in cycles of ½ second at each level. At the high current, heating and fusion take place and at the low current (which is enough to maintain the arc) the weld nugget cools and solidifies.

An outstanding example of the industrial use of TIG pulsed arc welding is the joining of copper commutator bars on traction motor armatures to the copper windings. The effect of unavoidable changes in fit-up and hence changes in the heat sink are minimised by using short durations of the welding current pulse and uniformity of penetration is thereby ensured.

There can be little doubt that the process will be used extensively in the welding of non-ferrous materials, especially in cases where there is a difference in thermal conductivity or thickness between the parts to be joined. The system is amenable to programming since welding of a long seam takes place as a sequence of discrete events. A recent development at The Welding Institute will improve the advantages of using pulsed TIG for welding thin non-ferrous metals—pulsed alternating current, instead of the conventional direct current, enables the mean weld current to be held low enough to reduce the formation of oxides which could cause weld defects.

Nickel alloys up to ½ inch thick can be welded almost without distortion using pulsed TIG. But this process could be faced with real competition in the precision joining of non-ferrous metals in the immediate future. Already the 1000 W laser at The Welding Institute has produced excellent welds in 1/10 inch thick nickel alloy, and the Institute will soon be working with powers up to 2000 W. Laser welds are similar to electron beam welds and have all the advantages of electron beam without the problems of having to work in a vacuum. With the increase in power output lasers will become increasingly competitive whenever joints with no distortion and minimum heat-affected zone are required. Commercial laser welding machines should be considerably cheaper than electron beam equipment.

Explosive welding of tube-to-tube plates in heat exchanger plant and explosive welding or cladding of thin sheets of expensive non-ferrous metals to steel is becoming commercially important. For example steel plate ½ inch thick costing about 5p/lb can be explosively clad with titanium 1/10 inch thick costing about £3/lb—the plates can be used in the fabrication



A prototype microfriction welding machine developed by the Welding Institute for the Department of Trade and Industry.

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## METALS IN INDUSTRY VI

# Reclamation methods improve

By ANDY McELROY

Recycling of used materials has become fashionable over the past five years, mainly as a result of concern with pollution. Now there are suggested schemes for recovering and re-using almost every type of product, from waste gases to plastic containers.

In some industries, however, this accent on reclamation has been in evidence for anything up to 300 years and perhaps, in some instances, even longer. Such long-standing frugality cannot be claimed for metals, but recovery and re-processing, at least of the more common materials, has been going on for long enough to make it an industry in its own right.

Reclamation of metals in their elemental form—copper from cables, lead from pipes, aluminium from saucepans—is a simple and straightforward task, involving low costs and fairly high returns. Even some common alloys—brass and bronze, for example—are useful for recycling although they are, in the strictest sense, not chemically reformed but merely re-worked into new products.

Separation of such alloys into their constituents is seldom worth while.

But this is not universally so, and the number of exceptions is growing steadily.

As with any operation in industry, its value depends on relative costs of alternative sources. Sudden rises in the cost of the virgin metals—and there have been plenty of these in the past ten years—cause industry to take a fresh look at the economics of reclamation processes once rejected as too costly.

It is exactly the same mechanism as has prompted mine-owners to reopen poor metal ore seams once by-passed in the search for rich and easily extracted sources.

Reclaiming metals from their alloys is seldom difficult technologically. Chemical and electrolytic methods exist for most separations and can be applied as and when costs reach the crossover point against extraction and refining of ores.

Separation in another sense is still the main problem in the recovery of metals and metal alloys themselves, however.

Companies concerned with scrap are still in the situation where identification and positive separation are costly and time-consuming, so that a large part of the available and useful metals are discarded as complete waste.

Ferrous metals present no problem, since simple magnetic separation is available cheaply. But the multiplicity of various metals and their alloys used in, for example, the motor-car, make hand-picking the only practicable way of categorising. Wage increases make such methods constantly more expensive, and can bring profits down to vanishing point. But what, at present, is the option? Is there any way in which this increasingly important separation can be done?

### Strictly limited

Until a few years ago, except for the precious metals, the answer would have been a categorical no. Even to-day, the scope of commercially available systems is strictly limited, but research both in this country and overseas indicates that the day may not be very far off.

Separation of such alloys into their constituents is seldom worth while. But this is not universally so, and the number of exceptions is growing steadily. As with any operation in industry, its value depends on relative costs of alternative sources. Sudden rises in the cost of the virgin metals—and there have been plenty of these in the past ten years—cause industry to take a fresh look at the economics of reclamation processes once rejected as too costly.

It is exactly the same mechanism as has prompted mine-owners to reopen poor metal ore seams once by-passed in the search for rich and easily extracted sources. Reclaiming metals from their alloys is seldom difficult technologically. Chemical and electrolytic methods exist for most separations and can be applied as and when costs reach the crossover point against extraction and refining of ores.

Separation in another sense is still the main problem in the recovery of metals and metal alloys themselves, however.

mechanised installations located by the major sources of scrap which also tend, fortunately, to be near the main customers.

Further down the industry, scrap collection will, as it has already tended to do, become more highly organised, with the operators of separation plant calling the tune rather than waiting for the largely adventitious loads that are the norm at present.

An inhibiting factor in this development will be the continuing uncertainty about metal prices. There is a general upward trend, but within this there are quite severe fluctuations that are the cause of much uncertainty. Reclamation of metals has always been a bit of a gamble, but mainly one concerned with only comparatively small capital outlay. How soon the industry will be prepared to take similar risks with perhaps ten times as much money remains a matter for conjecture.



Non-ferrous scrap awaiting processing at John Allan's works in Glasgow.

## Computers find new applications

By TED SCHOETERS

Slower than their counterparts in the iron and steel industry to apply automated process and production control systems to their manufacturing operations, the non-ferrous metal producers and manipulators nevertheless have some significant projects to observe and emulate.

Held back hitherto because of the multiplicity of products which are turned out in much shorter production runs than for steel strip, for instance, which made the introduction of computer control that much more complicated, many of the relatively small companies in the industry could be entering a new era in manufacturing techniques.

### Cost reduced

This is because the cost of small computers suitable for the relatively simple control loops which could improve productivity quite considerably, in several areas has been coming down with a rush and their simplest versions hardly go into four figures.

At the same time, the industry's own Research Association has made a big effort to tackle problem areas with its own mobile diagnostic tool—a rugged version of an Argus 500 mounted in its own vehicle—and has made the results freely available to member companies. BNF was one of the first, if not the first, in Europe to have such a facility, which cost £50,000 when it was supplied two years ago.

A first task carried out with this ubiquitous machine was to "listen-in" to the BNF's own pressure die-casting machine BAC 1-11 and Concorde, which has resulted in a considerable gain in man-hours in the moulding of the machine's body.

Armed with this knowledge, the unit was sent out to examine a number of other types of machine, and, by defining what the team calls "areas of uncertainty," it succeeded in finding ways of improving output considerably. The team did not criticise the builders of the equipment—it was a fact that no builder had so far had the opportunity of using such a sensitive tool to study his design of die-casting unit.

### Furnace control

Although few areas are so far ready for automatic control schemes, the members of the Association are taking notice of what has been achieved and implementing some of the results with favourable effects in their own works.

Meanwhile, a similar analysis project, but this time applied to furnace control, is ready to provide useful data for the industry. The diagnostic computer was taken for a fortnight to the Pechiney (Cegedur) aluminium centre near Clermont-Ferrand and linked to a furnace there to gather enough data for BNF staff to be able to derive a mathematical model of a melting furnace operation, which will have a very wide application.

According to John Robertson, who led the BNF team in France, furnace builders for the past 50 years have been guided

by rule of thumb methods and not by a scientific approach. But Cegedur and other similar companies in most of the European countries are extremely interested in the outcome of the work, which should in the near future yield data which will permit operators to run their furnaces at optimum levels through a better knowledge of just what happens during the process and therefore through a better ability to control the behaviour of their equipment.

The next stage, and it is not too far distant, will be to devise instrumentation and programs which will give operators some reactive control of the process.

Within six months to a year BNF will be in a position to advise potential users of small-scale computers on the possibilities of applying these stripped-down machines to save on fuel and improve the throughput of metal. The computing team can already provide guidance on automation in many other areas.

At the other end of the scale so far as computer sizes go is the use of dovetailing procedures, which permit a designer to work out a complex section of an aircraft frame or wing by a "conversation" with a computer terminal. This process can result in the production, finally, of the control tape for the machine-tool which will cut alloy for the finished section, however intricate this may be.

### Man-hours gain

An example of this technique in Britain is the Numerical Master Geometry program suite, first developed by BAC (Weybridge) for use on the pressure die-casting machine BAC 1-11 and Concorde, which has resulted in a considerable gain in man-hours in the moulding of the machine's body.

Subsequently this NMG facility has been offered generally by ICL to users of appropriately sized 1900 machines for the generation of difficult shapes starting from the simplest sketch.

This application involves the final product, which may be a highly sophisticated piece of equipment. But it is at the "bedrock," so to speak, that the earliest applications of automation were made. Several years ago, Elliott - Automation delivered what was then the first computerised spectroscopy equipment able to provide continuous, on-stream analysis of a flow of metalliferous ore through a processing plant to give a constant indication of copper, iron and titanium content.

The user, Palabora Mining in South Africa, needed the equipment to bypass intolerably slow chemical analysis methods demanding several hours during which process stream quality could fall off badly. It is true that the unit was based only on a small analogue machine from Elliott-Automation. But its immediate successor was a much more ambitious system, controlling five flotation streams for Bolidens Gruv (Sweden) containing iron, zinc, copper, lead and arsenic.

new combination of spectro-meter and computer for the analysis of complex experimental alloys. A Philips product, the stripped-down unit, and the unit will do in minutes work that a skilled analytical chemist might need weeks to carry out. Computer techniques have made a major impact in some areas when the immediate benefit was clearly definable and the potential users economically powerful enough to find quite extensive development work. General application by the

smaller organisations in the non-ferrous industry has had to wait the very recent appearance of the micro-machines which are making it economical for the first time, to use computers where staff on dial-watching routines or staff on dial-watching routines would have been required. Because there is much competition in the market, prices are probably at an all-time low and potential users should begin to think of applications now.

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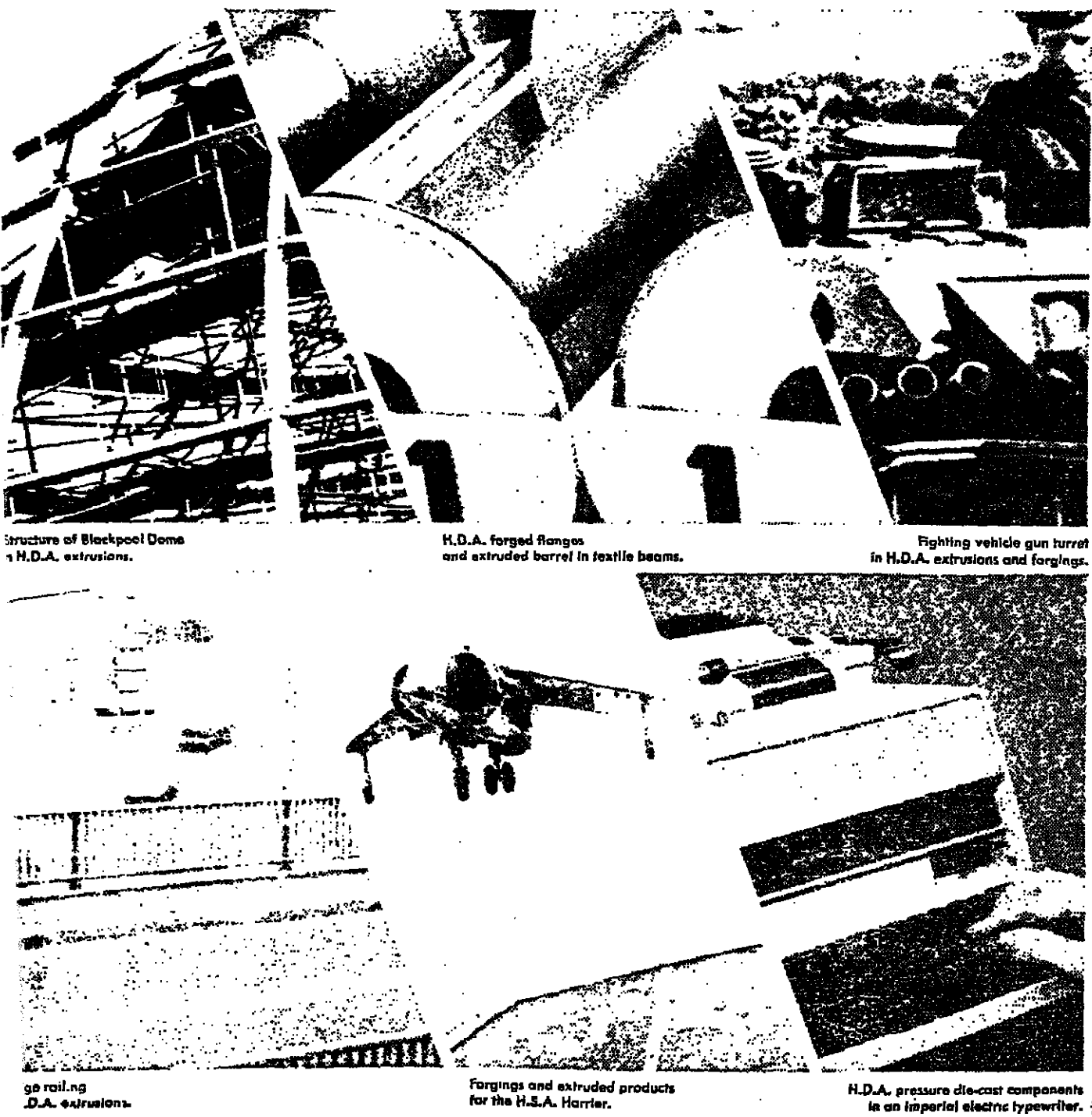
Aluminium alloys are tough, strong and light in weight with high resistance to corrosion. When they are formed by H.D.A., they can be almost any shape and can go almost anywhere—backed by years of experience of

forging, die-casting and extruding. Use our experience. We will have some very useful suggestions.

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Structure of Blackpool Dome is H.D.A. extrusions.

H.D.A. forged flanges and extruded barrel in textile beams.

Fighting vehicle gun turret in H.D.A. extrusions and forgings.

go railing H.D.A. extrusions.

Forgings and extruded products for the H.D.A. Harrier.

H.D.A. pressure die-cast components in an Imperial electric typewriter.



## ECONOMIC VIEWPOINT

## Trade, not money, is the problem now

BY SAMUEL BRITTAN

FORE discussing wider aspects of the world currency trading scene, one should observe the British Government's brilliant coup of last night when the pound was floated "for the time being".

Not only did the authorities themselves of the embarrassment of commitment to maintain an exchange rate which might have been quite unviable in the face of a flood of dollars; but they so inconspicuously, quietly and with a minimum of controversy, domestic or international.

The undeclared secret hope of many past British Chancellors, of "floating the pound from length" has now been achieved. But the theoretical affirmation of the \$2.40 parity, which now has no operational meaning, has so far succeeded beyond the wildest hopes of those who drafted the announcement. This wording has made a new policy acceptable to the public and others who are only committed to fixed exchange rates.

The British Treasury has ably avoided any major reversion of sterling, which would have been detrimental to its interests; yet by allowing some modest upward movement against the dollar, Britain is making an appropriate contribution towards the currency alignment on which the serious are insisting as a condition for the removal of a surcharge. Yet this help has been provided in a way that has avoided antagonising the public and has even earned the British Government high marks for "good Europeanism".

Nevertheless, despite all the

subtleties, the U.K. is on a genuinely floating rate, with no fixed limits in either direction. The \$2.38 floor for sterling which the Bank of England has announced is designed in the first place to reassure any nervous sterling holders who are out of touch with market conditions. It can be changed at any time (almost like Bank Rate) without a fresh act of policy. If Britain is to secure the full advantages that are possible from the new situation the

**'Despite all the subtleties, the U.K. is on a genuinely floating rate, with no fixed limits in either direction. The \$2.38 floor... can be changed at any time, without a fresh act of policy'**

\$2.38 floor should be quietly dropped at an opportune moment while sterling is still strong.

Assuming this is done, all options will remain open for the longer term. There can then be a large appreciation of sterling in the event of a British "economic miracle" or a gradual and timely depreciation if the more conventional view about Britain's place in the international inflation stakes, and of the effects of EEC entry on the country's overseas payments, prove nearer the truth. It is particularly important to pay this tribute, as the Treasury's strongest point

Although many other countries will also be floating in a similar way, some have still to take a clear-cut decision. By far the biggest source of confusion at present is the delay of the Japanese Government in deciding by how far and by what means to allow the yen to appreciate. French financial circles are also highly dubious of the ability of the French Government to maintain a fixed and unvalued parity against the dollar for current transactions if the floating "financial franc" should rise too high above it.

The transition to flexible rates has come, as has always seemed likely, as a result of the breakdown of the system of so-called "fixed exchange rates". The transition cannot therefore be as smooth as if it had taken place as part of a deliberately planned move, and it will take time for markets to settle down. Even so, foreign exchange markets may well settle down much more smoothly and quickly than the pessimists suppose, especially when the yen situation has been clarified.

Ultimately there will have to be a new set of rules for the international monetary system. But those who talk about conferences, initiatives and gestures have their priorities wrong. In particular, it would be a mistake to try to fix a new set of international parities too quickly. The negotiations of dozens of exchange rates, which would have to be right in relation to each other as well as the dollar, would be a hazardous undertaking; and the best chance of achieving a realistic pattern of rates is to allow the foreign exchange markets to find their own level with the minimum of political interference.

There are, of course, great

dangers as well as great opportunities arising from the Nixon message. But the dangers arise from the U.S. import surcharge and other protectionist gestures and not from the decision to "shut the gold window".

It was perfectly reasonable for the Americans to decide not to allow their gold stocks to fall below \$10,000m. (valued at the traditional official price). This has for a long time been regarded as the strategic minimum reserve. For whatever ones hopes for Special Drawing Rights and other man-made devices, there is a clear case for being prepared for political and military contingencies in which the paper I.O.U.s of international or national bodies cannot be honoured.

It would have saved a great deal of confusion if the U.S. had declared its intention of reopening the gold window at a new and slightly higher official price, thereby indicating the effective devaluation of the dollar at which it was aimed. Such a change can still not be ruled out as part of any international monetary settlement.

It is also an open question how long national monetary authorities will continue to value their gold stocks at the official price of \$35, which is now devoid of meaning, at a time when the free market price has been drifting above \$43. Some understanding will have to be worked out about the valuation of gold in settlements between governments and central banks. The future of the Washington Gold Agreement, under which the major monetary authorities undertook to abstain from buying or selling in the free market, will also have to be determined.

Looking further ahead, the whole question of the composition of national monetary

reserves—now uneasily divided between gold, dollars, sterling and SDRs may require some concerted action. The proposals for a new composite reserve unit, into which all the others will be merged, are tempting. But no one should forget that the international authority running such a unit would wield considerable political powers and involve a substantial sacrifice of sovereignty on the part of member nations.

These are not, however, the most immediate, nor even the most important, international economic questions. Given that he was not prepared formally to devalue the dollar against gold, shutting the gold window was the next best move that President Nixon could have undertaken. At a stroke he abolished the U.S. balance of payments problem and the fear of the gold

**'It looks suspiciously as if the President decided to take all or most of his options in the desire to be decisive. Thus we have both dollar depreciation and the measures prepared to avoid it.'**

stocks running out. To the extent that other countries have responded by floating their exchange rate, it should have abolished the balance of payments problem and the fear of currency crises for them, too. The real and severe criticism that history may have to make of President Nixon is that he

accompanied the floating of the dollar by the import surcharge, "huy American" tax cuts and other protectionist rhetoric and gadgets. Such measures might have had their place as a substitute for the exchange rate decision, not as an alternative to it. It looks suspiciously as if the President, presented with a number of alternative options, decided to take all or most of them in the desire to be decisive. Thus we have both dollar depreciation and the measures prepared to avoid it.

The most urgent and vital issue is therefore not some "new Bretton Woods" but a concerted attempt to put a time limit on the U.S. surcharge and the latest devices and to prevent retaliation by other countries in a profitless game of tit for tat.

In terms of international trading logic the Americans should withdraw their protectionist devices whatever the Japanese do. If they wish to give away goods without importing anything in exchange except paper dollars, it is the body of Japanese citizens who lose and the Americans who gain. But unfortunately, within that body of American gainers, there is a minority of producers sharply hit by Japanese competition and it is necessary for political reasons—as it has been with Lancashire and Asian textiles—to regulate and slow down the pace of readjustment and transfer to other activities.

This is the real connection between the trade and currency issues. The French do not occupy this role in the American market and if the French wish to accumulate dollars at the expense of their real standard of living of their own citizens, the rest of us do

not need to lose too much sleep over it.

There will doubtless be an attempt by the IMF and other bodies to get back to what is regarded as the "true" Bretton Woods system. By this they mean a system under which exchange rates remain normally fixed, but governments are

**'The concept of EEC monetary union has always seemed a classic case of putting the currency cart before the political horse. Nevertheless, such a joint move could well be attempted.'**

prepared to change them when they can be shown to be out of line. Unfortunately, such a system tends in practice either to ossify into one of exchange rate rigidity, or to crumble away into floating rates.

Similar troubles apply to the concept of "wider margins". These are all very well as a protection against purely temporary disturbances; but in the course of time the currencies would tend to become wedged against their upper or lower limits. Wider margins would only be the answer if accompanied by small and timely changes in the central parity itself. Under these conditions the market rate would not necessarily have to move after a change of parity; and indeed official exchange rate policy could then follow longer run market trends. A system of this kind would work in practice very much like one of floating rates; but those who value the assurance provided by a known parity would be comforted; and businessmen could feel confident that there would be no wild fluctuations or large jumps in a short period of time.

A much more immediate issue for the U.K. is the possibility that the EEC Ministers' meeting on September 13, or on a later occasion, agree to lock their parities together and float jointly against the dollar. Their failure to do this is far from being the tragedy that is so widely supposed. The concept of EEC monetary union has always seemed a classic case of putting the currency cart before the political horse. Nevertheless, such a joint move could well be attempted.

In that case Britain's right course seems clear. It is to express support for the move and keep in close touch, but not take part in the period before 1973 when we are not yet members. It was quite impossible to guess, even before the present currency storm, the right set of exchange rates at which to join the EEC. It is doubly so today; and it would be embarrassing and difficult to lock ourselves in at one parity relationship, and then try to unlock ourselves if it worked out badly.

By 1973 we will have a better idea of whether the proposed monetary unification is either workable or desirable. If it is, then the U.K. can at some stage join after having had a transitional period of floating in which to discover an appropriate exchange rate for EEC membership. In the meanwhile, sympathetic non-participation seems the right course. It is also the one which the Government will be advised to take by its best qualified advisers.

## Labour News

## Carr advice on tax misleading says TUC

BY MICHAEL HAND, LABOUR CORRESPONDENT

THE GOVERNMENT is accused by TUC leaders of having given misleading information about the extent to which unions will be allowed to register under the new industrial relations legislation which will still be in force to get tax relief on their

obstacle to the unions in separating off their president from the rest of the union.

Registration will be a burning issue at the September Congress with at least one union advocating a change in TUC policy from recommending unions not to register to instructing them not to do so under threat of expulsion.

This will be strongly resisted by some of those who feel that they may have no alternative but to register to protect their funds.

The rise in U.K. unemployment to more than 900,000 this month will also be a dominant issue at the conference which will have before it the TUC paper to the July-NECD meeting in which the general council said the Government should openly commit itself to a minimum rate of growth of the GDP of 5½ per cent a year from mid-1971 for at least two years.

It said that a measure of the gravity of the problem was that this rate would still at the end of 1973 be likely to leave unemployment above 500,000.

The general council report confirms that the Congress will be asked to sanction an increase by unions in annual affiliation fees to the TUC. As reported in the Financial Times last month it would go up to 10p for each member of an affiliated union—an increase of 2p. This will increase revenue by about £200,000 a year, raising the TUC's annual income to around £1m.

The last substantial increase in affiliation fees was in 1967, but the report points out that in every year from 1966 to 1970 expenditure has exceeded income. The total deficit over the period being £175,000. These deficits had been met out of reserves, as had the cost of about £120,000 of mounting the campaign against the industrial relations legislation.

Triumph, Coventry, back in production to-day

Triumph MOTORS, Coventry, resumes car production to-day after laying off 3,000 men for three days last week because of a work-to-rule by 90 internal transport drivers involved in a

managing dispute. The congestion of cars and materials caused by the drivers' action has been slightly eased during the last three days, but with the dispute continuing there could be more lay-offs this week.

Speke return

Triumph workers at the two factories at Speke, Liverpool, also return to work to-day following a strike over pay by painters since last Tuesday which caused a lay-off eventually involving most of the 2,800 labour force.

This cost a daily production loss of 150 Ford cars, and of Triumph car bodies including the TR6 and the 1500.

The Woodend body plant day staff will not return until tomorrow but to-night's shift will start production. The strike was called off to allow further talks.

As announced on Friday at production of Avenger cars by Chrysler U.K. in Coventry will be halted to-day and to-morrow with more than 3,000 employees thrown out of work each day and some on nights.

The cause is the continuing dispute involving the 10,000 toolmakers in Coventry who are protesting over the ending of the 30-year-old local toolroom pay agreement by Coventry Engineering Employers' Association. The toolmakers are banning overtime and refusing to co-operate with management.

Production will resume to-morrow at the Midland Motor Cylinder's foundry, Swetwick, after a two-week break because of a strike by 120 casting dressers, who return to-day.

The other 400 workers laid off will be back to-morrow.

## Berlin pact: first stage due to-day

BY MALCOLM RUTHERFORD

BONN, August 22.

THE first stage of a four-Power agreement on Berlin is confidently expected to be reached to-morrow, though the agreement will then be referred back to Governments for final approval before being signed—probably in about two weeks' time.

The provisional text is regarded with satisfaction by Western diplomats, who note that the Russians have made concessions which scarcely seemed likely only a few months ago.

The concessions are attributed to the departure from the East of a separate political entity of the East German leader, Herr Ulbricht, last May, and to further Soviet pressure on his successor, Herr Erich Honecker.

Key role

It is believed the Russians have persuaded the East Germans to accept certain short-term losses in the hope of long-term advantages. Among the latter would be international diplomatic recognition of the East German Republic and its probable admission to the United Nations.

Mr. Gromyko, Soviet Foreign Minister, is thought to have played a key role in convincing the East Germans when he was present in East Berlin last week, during the crucial stage of the four-Power negotiations.

The short-term losses to the East Germans are nevertheless considerable. A claim that West Berlin is a separate political entity of the German State appears to have been put into cold storage and the Russians have agreed that many of its strong ties with the Federal Republic can remain in being.

It is understood, for example, that West Berlin interests abroad will be represented by a combination of the three Western Allied Powers and the Government in Bonn.

This is a far cry from the East German and Soviet insistence

that such interests must become the responsibility of the West Berlin Senate, thereby reinforcing the theory of the separate political entity.

Immediate gain

In the short run, the one immediate gain to the Russians is that they will be allowed to establish a consulate-general in the Western sector of the city.

Its staff, however, will be accredited to the three Allied Powers and not to the West Berlin Senate. On paper, this no more affects the present status of Berlin than the establishment of a Soviet Consulate-General in Hamburg affects the present status of the Federal Republic.

In the longer run, the Russians are entitled to claim that Western Powers must now move forward towards a European security conference and the Bonn Government towards the ratification of the Bonn-Moscow treaty, signed a year ago.

A satisfactory Berlin settlement was made a pre-condition for both of these moves by the West.

Final 'package'

But there will still be a few months' grace. The signing of a Four-Power agreement must be followed by talks between the two German States on its practical implementation. These are expected to last at least three months. Only then will the four Powers seek to tie up the agreement in a final package and the Bonn-Moscow treaty for ratification.

In the process of the inner German talks, however, East Germany is likely to do much to advance its claims to international recognition, and it is acknowledged that the very fact that the talks will take place at all is a claim in itself.

## Rebels oust Bolivian President Torres

LA PAZ, August 22.

RIGHT-WING army rebels to-day ousted Bolivia's Leftist President Juan Torres after the loyalist Presidential Guard had surrendered in the capital. A Church spokesman said arrangements were being made for President Torres, who had earlier been reported directing resistance by the 1,500 guards to be conveyed from a hiding place "somewhere in the city" to the Papal Nunciature in a residential suburb.

Last night President Torres fled his palace as rebel tanks closed in. Hospital authorities estimated that at least 50 people had been killed and more than 200 wounded in the fighting.

The city's principal radio station, taken over by rebel supporters early to-day, announced that Colonel Hugo Banzer, named as leader of a military triumvirate, would broadcast to the nation later.

The radio said Col. Banzer at one time apparently a prisoner of Torres' forces—was with an armoured regiment at Viacha, 12 miles south of the capital. He would travel to the presidential

palace to make his broadcast, the radio added.

Hugh O'Shaughnessy writes: The reported victory of the Right-wing rebels in Bolivia this week-end does nothing to improve the prospects of the tin industry. The consolidation of a conservative regime in La Paz could be a blow to the tin industry, which is fast being

exhausted. The Bolivian industry is a costly, labour-intensive operation, and appalling working conditions ensure that political

## CUNARD WRIT AGAINST FORMER BOARD MEMBER

The Board of Cunard Steamship Company is issuing a High Court writ, claiming damages for alleged slander, and libel against Mr. Donald Forrester, who resigned earlier this month from the Board in protest against acceptance by most of the Board of the bid for the company by Trafalgar House Investments.

## Treason charge in Egypt

BY OUR OWN CORRESPONDENT

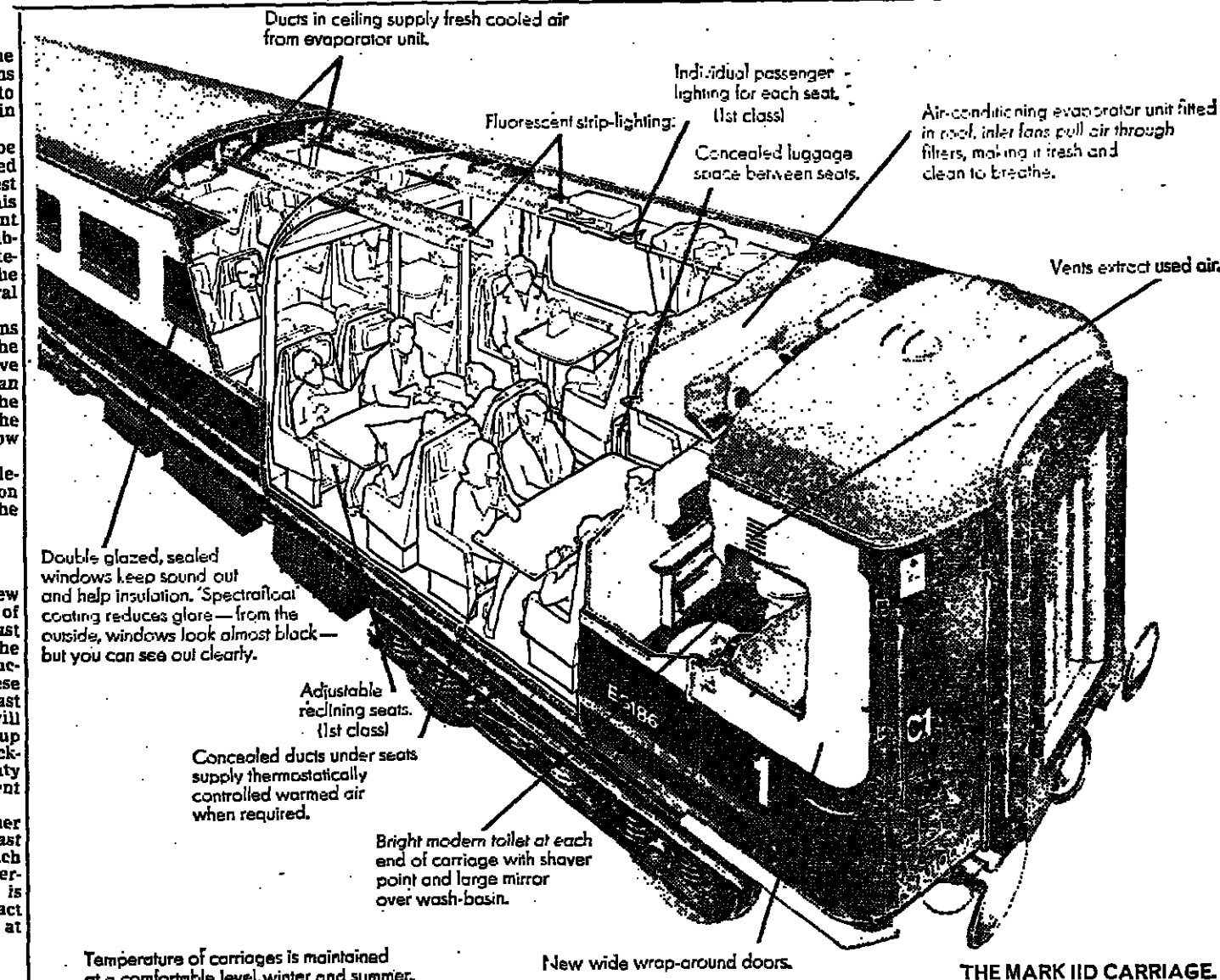
CAIRO, August 22.

THE 91 defendants will be first charged by President Sadat on May 14.

General Mohamed Fawzy, the former War Minister, will be tried separately by Supreme Court Martial. The indictment claims that Fawzy was to have headed the Presidential Council planned by the defendants to assume authority.

The charges come after a three-month investigation into the alleged attempt, which was first disclosed by President Sadat on May 14.

General Mohamed Fawzy, the former War Minister, will be tried separately by Supreme Court Martial. The indictment claims that Fawzy was to have headed the Presidential Council planned by the defendants to assume authority.



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Inter-City is faster than the motor-car (London-Leeds 2 hrs. 35 mins.—fastest time), more comfortable than the motor-car (we do the driving, you do whatever you like) and more relaxing than the motor-car (dinner on the way home?).

Now there's Air-conditioned Inter-City with sealed, anti-glare windows, and brighter interiors. Smooth. Quiet. Perfectly comfortable. Taking a giant step into the Seventies.

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## Your air-conditioned services MONDAYS TO FRIDAYS

London to	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.	Dep.	Arr.
Yorkshire	0755	1150	1230	1555	1900			
Dep. King's Cross	0755	1150	1230	1555	1900			
Dep. Hitchin								
Dep. Peterborough								
Arr. Grantham								
Arr. Newark								
Arr. Retford								
Arr. Doncaster								
Arr. Wakefield	1014	1348			2123			
Arr. Leeds	1034	1408			1830			
Arr. Bradford	1108				2211			
Arr. Harrogate					2248			
Arr. Hull								
Dep. Hull								
Dep. Harrogate								
Dep. Bradford								
Dep. Leeds	0725	1150	1622					
Dep. Wakefield								
Dep. Doncaster								
Arr. Peterborough								
Arr. King's Cross	1002	1010	1500	1940	2106			

Six Newcastle services are also air-conditioned now. Ten Scottish and ten more East Coast main line services will be introduced later in 1971.



## ISSUE NEWS AND COMMENT

## City of Nottingham £5m. 8% stock

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# INTERNATIONAL COMPANY NEWS OVERSEAS MARKETS

## Euro \$ bonds retreat from the brink of collapse

BY WILLIAM LOW

IN THE SPACE of just one week, the Eurobond market, like much else in the financial world, has been turned upside down by President Nixon's salvage operation on the dollar.

From being on the brink of what many bankers considered to be total collapse, the Eurodollar bond market has recovered to the point where some operators are confidently taking in terms of a record flow of new issues to satisfy the renewed appetite of investors.

Unfortunately, as is often the case in the volatile Eurobond market, this prediction is somewhat premature.

The truth is that the Nixon bombshell is just the first of a series of moves towards effecting a radical change in the international monetary system: since the subsequent steps remain to be taken, no one can be sure what state the market will be in this time next week, let alone next month.

The immediate reaction of the market to President Nixon's measures was to mark-up prices of straight-debt dollar bonds and convertibles issued by U.S. corporations.

Japanese convertibles, in contrast, lost as much as 10 per cent of their value in reaction to the spectacular decline of the Tokyo Stock Exchange.

However, towards the end of the week, when the expected revaluation of currencies like the Yen failed to materialise, selling—especially from Switzerland—brought down prices from their peaks, while Japanese bonds recovered slightly.

Wise, no borrower has tried to float a dollar denominated loan, although General Motors and TRW might wish that they had delayed their offerings by a few days.

Until the situation becomes clearer, very few dollar issues are likely to come to the market. Looking ahead, prospects for

## ELECTROLUX EXPORT SALES HIT 71%

By John Walker

STOCKHOLM, August 22. ELECTROLUX group sales for the first six months of this year are up 10 per cent to a total of Kr1,005m, against the same period in 1970. Sales outside Sweden represented 71 per cent of the total turnover, compared with 68 per cent during the first half of last year. It should be possible, the company states, to increase group profit for the whole of 1971 by 10 per cent, as compared with 1970.

Exports—mainly in the form of deliveries from the parent company to subsidiaries—increased to Kr220m, as against Kr174m during the first half of 1970, showing an increase of 25 per cent. Meanwhile, the Swedish market has continued to weaken and the situation has brought about a stagnation in total sales on the Swedish market.

Cash-hungry American corporations should also benefit from a rising Wall Street as they want to issue equity-linked loans. It is more difficult to predict with any degree of certainty what the future will be for Eurobonds denominated in currencies other than the dollar.

Perhaps the greatest question mark surrounds the European Unit of Account (EUA). Much of the recent popularity of the EUA formula has been based upon currency unrest. If this is removed, then the EUA could suffer.

I intend to deal with this particular point in a later article.

## MADRID STOCK EXCHANGE PRICES

		Percentage of par value (Ptas.500)		
Name of stock		High	Low	Close
		August 2		
Aldos Hornos de Vizcaya	96	94	94	
Banco Central	967	967	967	
Banco de Bilbao	872	857	857	
Banco de Vizcaya	896	790	790	
Banco Esp. de Credito*	750	736	736	
Banco Exterior de Esp.	382	381	381	
Banco Hispano Americano	745	738	738	
Auxiliar de Ferrocarriles	122	120.50	120	
Cia Industrias Agricolas	285	281	281	
Cia Esp. de Petroleos	294	285.50	285	
Cia Ins. del Nitrogeno†	132	128	128	
Cia Sev. de Electricidad	227	226	226	
Cia Telefon. Nal. de Esp.	295	284	284	
Dragados y Construcciones	580	575	575	
Enbr. Azuc. Alcobaceros	701	690	690	
Espanola del Zinc	123	123	123	
Fuerzas Elect. Catalanas†	233.50	230.50	231	
Galerias Preciados	315	315	315	
Hidroelectrica Espanola	234.75	231.50	233	
Iberdruero	285	283	284	
Union y el Fenix Espanol	690	680	686	
Min. Sid. de Ponferrada†	158	153	153	
S. A. C. Ros	193	189	191	
S. E. Auto. Turismo Seat	290	285	290	
Asitleros Espanoles†	72.50	72	72	
Sed. Met. Duro Pelguera	71.50	71	71.25	
Chelona Espanola Snaice	155	151	151	
Union Explosivos R.T.	270	266	266	
Simagot	240	240	240	
Banco de Santander	845	834	834	
Par values: Ptas.500 except * Ptas.250, † Ptas.100				

Par values: Ptas.500 except \* Ptas.250, \* Ptas.150, \* Ptas.1,000. Source: Banco Central Madrid.

## CANADIAN WEEKLY LIST

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## AUSTRALIAN WEEKLY LIST

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## Indices

### NEW YORK

#### DOW JONES AVERAGES

Close	High	Low	Open	Prev. Close
11,880	11,900	11,860	11,880	11,880
11,880	11,900	11,860	11,880	11,880
11,880	11,900	11,860	11,880	11,880
11,880	11,900	11,860	11,880	11,880

## STANDARD AND POORS U.S. STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## AUSTRALIA

### MELBOURNE STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## EUROPE

### PARIS STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## INDONESIA

### JAKARTA STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## SINGAPORE

### INDUSTRIAL STOCKS

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## JOHANNESBURG

### MINES STOCKS

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## IND. DIVIDEND YIELD

### NEW YORK

Aug. 13	Aug. 6	Aug. 20
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## STOCK AND BOND YIELDS

### NEW YORK

Aug. 13	Aug. 6	Aug. 20
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## TOKYO

### NEW SEI INDEX

Aug. 13	Aug. 6	Aug. 20
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## EUROPE

### PARIS STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## INDONESIA

### JAKARTA STOCK INDICES

Aug. 20	Aug. 13	Aug. 6
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880
11,880	11,880	11,880

## HONG KONG

### INDUSTRIAL STOCKS

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## JOHANNESBURG

### MINES STOCKS

Stock	Aug. 13	Aug. 20
Alcan. Can. Al. Inc.	47	47 1/2
Alcan. Can. Alum.	14 1/2	14 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2
Alcan. Can. Alum. (P)	2 1/2	2 1/2

## OVERSEAS SHARE INFORMATION

### NEW YORK

#### RAILROADS

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### INDUSTRIES, ETC.

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### PUBLIC UTILITIES

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### TRUSTS, BANKS & BONDS

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### GERMANY

#### PARIS

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### MILAN

#### BRUSSELS

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### TOKYO

#### STOCKHOLM

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### AMSTERDAM

#### OSLO

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### COPENHAGEN

#### STOCKHOLM

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### STOCKHOLM

#### STOCKHOLM

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### STOCKHOLM

#### STOCKHOLM

High	Low	Stock	Aug. 20
11,880	11,880	Alcan. Can. Al. Inc.	47
11,880	11,880	Alcan. Can. Alum.	14 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2
11,880	11,880	Alcan. Can. Alum. (P)	2 1/2

### STOCKHOLM







**F.T. SHARE INFORMATION SERVICE**

BRITISH FUNDS										CANADIANS									
Interest	Stock	Closing Price	Dividend	Gross Yield %	Dividend	Usually Paid	Closing Price	Dividend	Gross Yield %	Interest	Stock	Closing Price	Dividend	Gross Yield %	Dividend	Usually Paid	Closing Price	Dividend	Gross Yield %
"Shorts" (Lives up to Five Years)										A.M.J.S. O.M.B.U. Paper									
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00
10P.	10.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00	100.00	1.00	100.00	1.00	1.00	1.00	1.00	100.00	1.00	1.00

[illegible]

MINING AND METAL—General Contd.

Stock	Price	Change	Volume	High	Low	Open	Close	Settle	Time
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.00	15.50	15.50	15.50	15.50
Sept. Heat (Wright) 100	15.50	1.50	1.0	16.00	14.0				

For Notes, see Page 12



## TEAS—Continued

[illegible]



# QUAKER AID

reaches  
JORDAN, VIETNAM,  
NIGERIA.

Donations urgently required by  
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## Lombard

# Nixon's lesson in economics

BY JOE ROGALY

MR. NIXON has been described as many things, but not often as a serious contributor to the development of economic analysis in the Western world. This may be the year to describe him, although the proof, one way or the other, cannot in the nature of things be available until several years from now. The reason is, of course, that he has introduced a policy of intervention in what was previously thought to be the greatest free market economy the world had ever known. He has proudly described it, without actually mentioning the dread Democrat's name, as the most important change in economic policy since President Roosevelt's neo-socialist New Deal.

## Not whole truth

Now the cynics have already found a reason for this. Their argument is that the President is anxious to win a second term at the November 1972 elections and that almost everything he does from now on will be explicable in the light of that fact. This is almost certainly true, but it is not the whole truth. Mr. Nixon is best understood as a Republican version of Mr. Wilson, a man who is almost likely to take sudden and spectacular initiatives at times when he feels the need to win the approval of the voters. As a result he is a servant of events rather than their master, and it is surely events that have forced the latest change of economic policy upon him, rather than any conversion to a new philosophy.

We are all prisoners of the same series of events that caused Mr. Nixon to act as he did; namely, the inflation that has afflicted all the countries of the West. This has been accompanied in particular by a high and electrically unacceptable rate of unemployment. And whatever the rights and wrongs of orthodox economic analysis may be, the simple fact is that in this situation many people have come to lose faith in free market economics as a way out.

## Consumer pays

This is especially so when they come to consider wage inflation. It is absurd to go on believing that any market force, operating in the conditions of Western democracy, could overcome the power of modern trade unions. It is not sensible to assume that the power of consumers will force companies to keep prices down and thus bolster their determination to avoid back inflation. In fact, the contrary is true. In fact, the experience of all Western economies, and it is for this reason that analysts who are prepared to recognise existing facts, rather than abstract theories based upon anachronistic assumptions, have been engaged in the search for some kind of incomes policy.

Events have forced Mr. Nixon to bow to this line of reasoning. Unhappily, he has done so in such a manner that there is a great danger of his policy failing, and being even to fail. The American trade unions are already showing signs of unwillingness to co-operate, and it would be surprising if American companies had not already begun to invent ways of getting around the inadequately policed price freeze. Worst of all, nobody has any clear idea of what to do when the 90 days of the freeze are over. There is likely to be plenty of material available next spring for classical economists to add to their long and gleefully polished lists of incomes policies that have not worked.

## Incomes policy

Perhaps, just this once, the lesson will be learned over time. A workable incomes policy will surely be devised one day, but when it is it will not be a magic structural device. The outline that drives it can only exist in people's minds. If there is a generally accepted notion that Government policies are more or less fair and that such-and-such a rate of increase of wages and prices is the least harmful, then most people will probably be prepared to work within these limits. So long as it is socially acceptable for trade unions to extract indigenous wages, and for well-to-do employers to grant them, the present process will continue; it will be spurred on while people continue to believe Government policies to be hard on the average working man (in Britain those on £25 to £35 a week). A change can only be slow, and it will never work unless it is well-thought-out and widely discussed in advance. If we learn this from Mr. Nixon's mistakes, he will indeed have contributed, however modestly, to economic thought in the West.

## THE LEX COLUMN

# Changes in the approach to acquisitions

The scene among to-day's survivors in a "limited conglomerate" form—aiming at not U.K. seems to be as active as ever, and it is interesting to see how flexible thinking (and precedent) has enabled them to survive with less dramatic upsets than some of their U.S. counterparts.

The shortcomings of the traditional U.K. industrial holding companies led to a new species in the late sixties which for convenience we may as well call conglomerate, of which the obvious example was Slater Walker. One might arbitrarily say that this species differed in that it believed in much closer financial and management control on the one hand and in periodic reversals from earnings into assets on the other.

If this was equally true of the typical U.S. conglomerate, the U.K. examples soon had the benefit of hindsight as to the dangers of overdiversification (in taxing managements' capacities). Perhaps as a result, the species can be seen to have

entrepreneur's ability to achieve

real growth (in share price) is limited by the absolute size of his vehicle, so that, for example, a doubling of intrinsic worth per share in a given period which involved a trebling of share capital would tend to be rejected in favour of respective rises of, say, 50 and 60 per cent.

The position of IT & T—the one apparently invincible monster conglomerate—bears thinking about in the broader context of national scale.

Sterling Guarantee, Drakes and perhaps Adante appear to be examples of this school, whose acquisition targets tend to be asset situations which can be bought at discounts on easily realisable worth. The financial tools are first and foremost cash, then short term loan stock and in the last resort equity or convertible paper: as to use of cash, Adante's acquisition of Williams Hudson was the illustration to end them all.

Meanwhile, assets are of course the main game of most of the "acquirers" (one thinks particularly of the SWS asso-

ciates), and the sport will presumably progressively defeat its object as the game gets rarer: Sterling, for example, would probably be the first to admit that Wharf Holdings is not as attractive a project as Gamages. The intriguing speculation is whether, if the U.K. accedes to the Common Market, continental Europe will provide a much more fertile hunting ground.

Truman Trio

Last Friday, following the Prudential's sale through the market of its 5 per cent stake in Truman Hanbury, the advice in this column was that shareholders without capital gains tax problems should follow suit. In the event, it seems that something like 1m. Truman shares (a little over 2 per cent) changed hands on that day. But considering that something over 10 per cent is estimated to remain with a number of institutional shareholders, it may be worth recalling how complicated the gains tax problem would

have to be to make acceptance of either the Grand Met or Watney bids a necessity.

The meat of the argument is that a logical investment policy involves selling winners as well as losers and thus, sooner or later, accepting the need to pay gains tax. Truman is quite an extreme case, since at around 455p there is a 234 per cent appreciation on its Domesday level. Yet if one sold Truman now, and invested to produce a further gain of 25 per cent, the effect net of gains tax would be virtually the same as acceptance followed by a 20 per cent gain in the "winner's" equity.

There is, of course, the point that gains tax paid does not produce income whereas gains tax contingent does. That hardly seems an adequate argument with any selection of reinvestment yields to choose from; and the joke is that inertia, in market terms, will force an even more difficult choice on the holder—to wit, Grand Met or Watney paper.

Accepting that both suitors, in

their different ways, would eventually get enough out of Truman to cover initial earnings dilution, there is little to choose between them on p/e terms with Grand Met on a prospective 15.9 at 181p and Watney on 15.1 at 123p. The difference is that Grand Met is willing to stand on a record of explosive earnings growth whereas Watney in recent years, has not been one of the success stories among the brewing majors. It might be argued that its apparent marketing success with "Red," the infusion of Truman, accelerated rationalisation and reduced capital expenditure might change all that. But the point is that Watney already, on the estimate of one uncommitted analyst, stands in p/e terms at less than a point discount to the prospective majors' average; it was at 4 points' discount as recently as April. Given that, and the Grand Met track record, the choice is between achievement inadequately reflected in the market, and ambition which

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